BROWARD COUNTY, FLORIDA
SHORE PROTECTION PROJECT

SEGMENT II AND III RENOURISHMENT

GENERAL REEVALUATION REPORT
WITH FINAL ENVIRONMENTAL IMPACT STATEMENT

PREPARED BY:

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PREPARED FOR:

BROWARD COUNTY, FLORIDA

JUNE 2003

BROWARD COUNTY SHORE PROTECTION PROJECT
GENERAL REEVALUATION REPORT
SEGMENTS II & III

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INTRODUCTION

1. This report summarizes the general reevaluation of the Federally authorized shore protection project for Broward County, Florida Segments II and III. The results of the planning, engineering, environmental, geotechnical, economic and real estate studies of the area and its shoreline erosion problem. Modifications to the authorized shore protection project are investigated in the interest of reducing total project costs.

STUDY AUTHORIZATION

2. The Broward County Shore Protection Project was authorized by Section 310 of the 1965 River and Harbor Act, Public Law 89-298 passed October 27, 1965 (79 STAT.1090). The project is described in House Document 91, 89th Congress. Authority was granted "to permit construction of the beach erosion control features of the projects by local interests, if they desire, with subsequent reimbursement of the Federal share of the beach erosion control work done by them after initiation of the survey study, provided that the work is approved by the Chief of Engineers as being in accordance with the authorized projects." The beach construction detailed in this report is to be done on a reimbursement basis for the Federal share of the engineering, sand investigation, plans and specification preparation, contract administration and supervision, construction costs, and biological, turtle, aerial and beach monitoring. In the past, the local sponsor (Broward County) has constructed all of the shore protection features along the Broward County shoreline. Appendix G contains recent correspondence stating Broward County's desire to extend this arrangement into the future.

PROJECT LOCATION

3. Segment II of the Broward County Shore Protection Project is located 32 miles north of Miami Beach on the southeastern coast of Florida. This segment of the Broward County Federal project consists of 11.3 miles of Atlantic Ocean shoreline from Hillsboro Inlet south to Port Everglades Inlet (Figure 1). The segment is located on a barrier island entirely within Broward County. The municipalities within the segment include Pompano Beach, Sea Ranch Lakes, Lauderdale-by-the-Sea, and Fort Lauderdale.

4. Segment III of the Broward County Federal project consists of 6.8 miles of Atlantic Ocean shoreline from Port Everglades to the Broward County/Dade County line (Figure 1). The segment is located on a barrier island entirely within Broward County. The municipalities within the segment include Dania, Hollywood, and Hallandale. John U. Lloyd State Park is located within Segment III on the south side of Port Everglades.

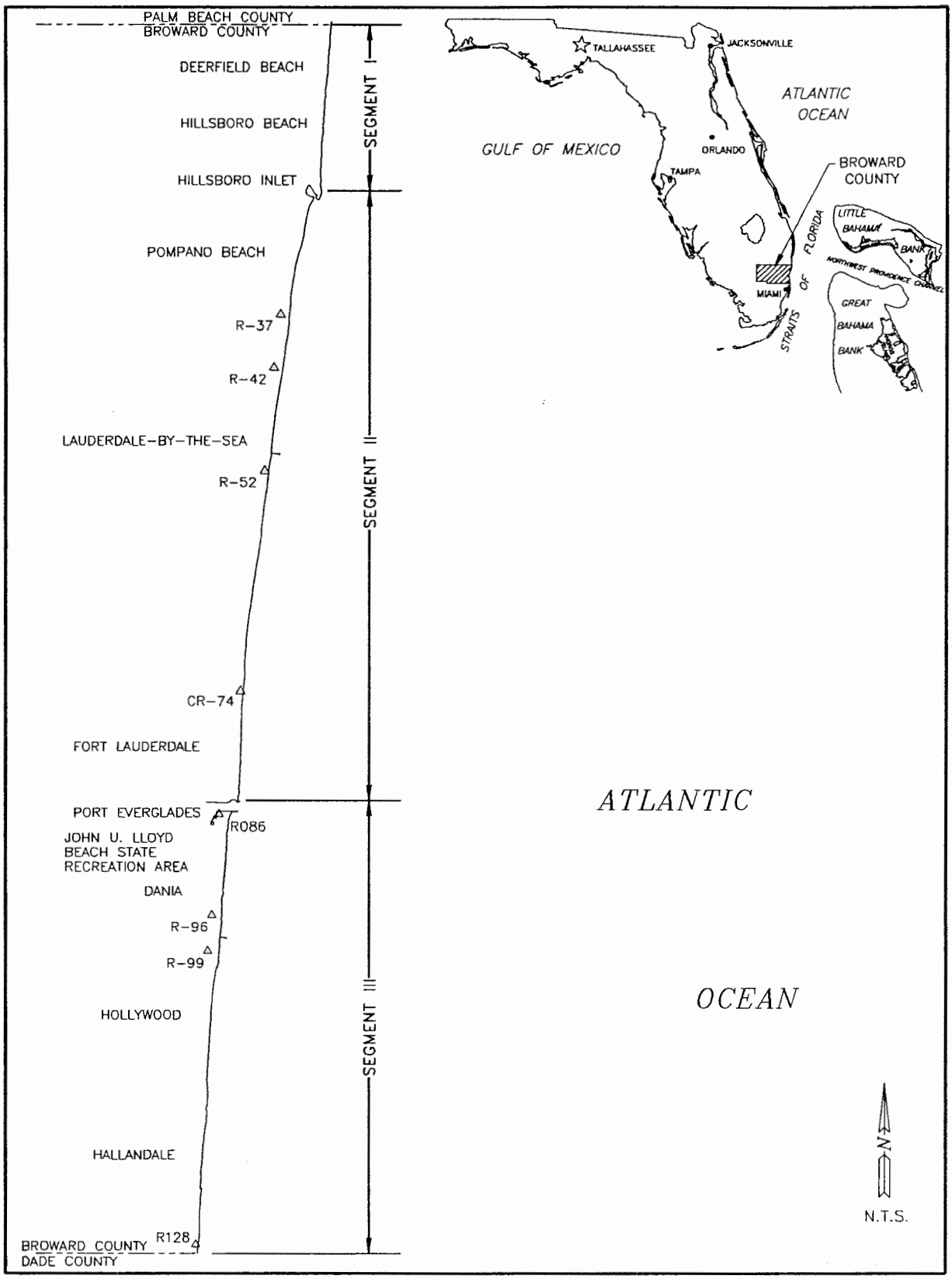

FIGURE 1

BROWARD COUNTY LOCATION MAP

PURPOSE AND SCOPE OF REPORT

5. This report is a reevaluation of the previously constructed portions of the federally authorized shore protection project along Segments II and III in Broward County, Florida. The study contains an engineering appendix suitable for preparing plans and specifications for the project. Modifications to the authorized project which have the potential for adding project benefits and reducing the overall average annual equivalent cost of project implementation were considered. The selected plans in both Segment II and Segment III and the respective proposed project cost apportionment presented in the report reflect current data pertinent to shoreline positions, shore ownership and use, real estate valuations, geotechnical investigations, environmental issues, and estimated project costs. Contingent upon approval of the reporting officer's recommendations, preparation of plans and specifications and subsequent construction of the project segments will be subject to availability of Federal and non-Federal sponsor funds and will be subject to Department of the Army policies, guidance, and regulations.

6. The current report presents sufficient technical and economic analyses environmental coordination and plan formulation to support the recommended project modifications presented in the main text. Included within this report are discussions of the existing Federal shore protection and navigation projects within Broward County, authorized and alternative project features, implementation requirements, (Federal and non-Federal), coastal engineering and geotechnical analyses.

7. The main text of the report is an overall presentation of the findings giving the results of the general reevaluation study for storm damage reduction and recreation benefits in the project area. It presents a broad view of the overall study and provides a generalized description and discussion of project features and purposes.

8. The main text includes a Final Environmental Impact Statement (EIS) which will be circulated under policies and procedures establishing for coordinating civil works activities pursuant to the requirements of the Office of Management and Budget Circular A-95 and the Fish and Wildlife Coordination Act. The EIS will be coordinated with State and Federal resource agencies.

9. Site climatology, littoral processes, and estimated project costs are presented in the Engineering Appendix. The climatological parameters described included wind, wave, and water level information. Histories of shoreline change and dredging activities at and adjacent to Hillsboro and Port Everglades Inlets are also addressed. Existing shore protection measures implemented along the project area which range from seawalls, bulkheads, and rubble revetments are inventoried. The Geotechnical Appendix presents the classification of material at seven offshore borrow areas.

10. The appendices to the report present supporting data for recommendations presented herein as follows:

Appendix A contains engineering investigations for Segment II
Appendix B contains engineering investigations for Segment III
Appendix C contains the economic analysis for Segment II
Appendix D contains the economic analysis for Segment III
Appendix E contains the geotechnical investigations
Appendix F contains the real estate gross appraisal
Appendix G contains pertinent correspondence
Appendix H contains the Project Cooperation Agreement (PCA)

THE AUTHORIZED PROJECT

DESCRIPTION

11. The Broward County and Hillsboro Inlet, Florida shore protection project and navigation project was authorized by Section 310 of the 1965 River and Harbor Act, Public Law 89-298 passed October 27, 1965 (79 STAT. 1090). The project is described in House Document 91, 89th Congress. Figure 1 includes the location map of the project area, and the vicinity map showing the limits of the three segments that constitute the 1965 authorized project.

12. The project provides for initial beach fill of adequate width and elevation and periodic nourishment county wide, as needed. The survey report (USAED 1963) identified four problem areas in Broward County located in three segments, from the North county line to Hillsboro Inlet (Segment I), from Hillsboro Inlet to Port Everglades (Segment II) and from Port Everglades to the south county line (Segment III). Improvements for navigation at Hillsboro Inlet were economically justified in combination with the beach protection measures for the reach from Hillsboro Inlet to Port Everglades. The three segments were authorized to be constructed independently of each other as three separate usable parts. Federal participation was limited to the first 10 years of project life. The project was authorized for construction by local interests, with subsequent reimbursement of the Federal share of project costs. Section 506 of the 1996 Water Resources Development Act, Public Law 104-303 dated October 12, 1996 (110 STAT. 3757) extended Federal participation in the Broward County shore protection project for a period of 50 years beginning from the date of initiation of construction for Segments II and III. Section 311 of the 1999 Water Resources Development Act, Public Law 106-53 dated August 17, 1999 (113 STAT. 301) modified the Broward County shore protection project to authorize the Secretary, on execution of a contract to construct the project, to reimburse the non-Federal interest for the Federal share of the cost of pre-construction, engineering and design for the project, if the Secretary determines that the work is compatible with and integral to the project.

12a. Hillsboro Inlet is a shallow draft navigation project authorized as part of the Federal project titled "Broward County, Florida, Beach Erosion Control and Hillsboro Inlet Navigation Project." The project was deauthorized on January 1, 1990 under the authority of Section 1001 of the Water Resource Development Act of 1986, Public Law 99-662, dated November 17, 1986, due to funding inactivity for this project feature. Subsequently, Section 107(a)(3) of the 1990 Water Resources Development Act, Public Law 101-640, dated November 29, 1990 (104 STAT. 4620) reauthorized the project.

12.b. The solution to the erosion problem in 1965 incorporated advance nourishment into the initial fill, and provision for periodic nourishment of those and any other portions of shoreline in the county where future erosion might occur. For the purposes of estimating costs, a five-year nourishment period was considered in the report. Sand transfer from north of Hillsboro Inlet to the down drift beach was to contribute to the nourishment efforts with all other material being truck hauled from inland sources. The remainder of the county shoreline was not in need of restoration or nourishment at that time because it was stable, accreting, or considered as future recipient of down drift benefits from the proposed construction.

12.c. The authorized projects are summarized in Table 1.

13. Design of the restored beach was based on the criteria that wave energy would dissipate seaward of upland property, and adequate area would be provided for recreational bathing. It was determined from existing profiles that a berm elevation of +10 feet mean low water (MLW) would provide protection during all but the most severe storm events. Design slopes for the adjusted post construction profiles were set at 1 vertical (V) to 20 horizontal (H) from berm crest to mean low water, thence 1 V to 30 H to intersection with the existing bottom. The width of the restored beach would be controlled at the pre-project mean high water (MHW) shoreline, and would extend seaward from 75 to 125 feet (ft) depending on existing conditions. Advance nourishment for five years of erosion (at the existing rate) was considered in order to maintain the design section between nourishment efforts.

EXISTING LOCAL COOPERATION AGREEMENTS

14. The following agreements between the Federal government and Broward County pertain to this project:

Segment II

- Master Agreement – Local Resolution passed by the Broward County Board of Commissioners dated September 17, 1968, and accepted by the District Engineer by letter to the Board dated November 22, 1971. The agreement covered the Pompano portion of Segment II.

- Local Cooperation Agreement, Hillsboro Inlet to Port Everglades, dated May 21, 1984 was executed by the District Engineer and the Board of County Commissioners dated May 21, 2984. The agreement covered the Pompano to Lauderdale-by-the-Sea portion of Segment II. The draft agreement was approved by SADRE-O memorandum dated May 14, 1984.

Segment III

- Master Agreement dated April 6, 1976 was executed by the District Engineer and the Board of County Commissioners on April 23, 1976, and approved by Secretary of the Army, Director of Real Estate on May 11, 1976. The Agreement

Table 1
BROWARD COUNTY, FLORIDA
SUMMARY OF BEACH EROSION CONTROL PROJECTS

REPORT	WORK	APPROVAL
MARCH 1963. **BROWARD COUNTY, FLORIDA** **BEACH EROSION CONTROL AND** **HILLSBORO INLET NAVIGATION** **REPORT.** PUBLISHED AS HOUSE DOCUMENT NO. 91, 89th CONGRESS. DA, CHIEF OF ENGINEERS LETTER DATED JUNE 15, 1964, SUBMITTING REPORT.	AUTHORIZED IMPROVEMENTS TO ALL OF THE SHORELINE OF BROWARD COUNTY AND IMPROVEMENTS OF THE HILLSBORO INLET TO PROVIDE ADEQUATE NAVIGATION FACILITIES. **INITIAL RESTORATION TO PORTIONS** **OF AND PERIODIC NOURISHMENT AS** **NEEDED FOR ENTIRE SHORELINE** **OF BROWARD COUNTY.** DIVIDED BROWARD COUNTY SHORELINE RESTORATION PROJECT INTO THREE SEGMENTS.	PROJECT AUTHORIZED BY PUBLIC LAW 89-289, RIVERS AND HARBORS ACT PASSED 27 OCT 1965.
SEGMENT II, HILLSBORO INLET TO PORT EVERGLADES		
POMPANO 1970 (STUDY/REPORT NOT FOUND)	1,030,000 CUBIC YARDS OF SAND WAS PLACED OVER A 2.2 MILE REACH IN 1970.	DAEN-CWP-E (12 JUN 73) 1ST IND DATED 8 NOV 1973. APPROVED REIMBURSEMENT OF THE FEDERAL SHARE OF THE COST OF IMPROVING THE SOUTHERLY 2.2 MILES OF THE POMPANO BEACH PROJECT SUBJECT TO THE DETERMINATION THAT ADEQUATE PUBLIC BEACH ACCESS WAS AVAILABLE.
NOVEMBER 1981. **GENERAL DESIGN MEMORANDUM FOR** **SEGMENT II OF BROWARD COUNTY** BEACH EROSION CONTROL PROJECT. **HILLSBORO INLET TO PORT EVERGLADES** **(POMPANO/LAUDERDALE-BY-THE-SEA)**	1,750,000 CUBIC YARDS OF SAND WAS PLACED ON A 5.3 MILE REACH JUST SOUTH OF THE HILLSBORO INLET IN 1983.	SADEN-GC (11 AUG 81) 1ST IND DATED 18 SEP 1981. RETURNED TO DISTRICT WITH COMMENTS. SAJPD-C (11 AUG 81) 2ND IND DATED 3 FEB 1982. SUBMITTED TO SAD FOR REVIEW AND APPROVAL. SADEN-GC (11 AUG 81) 3RD IND DATED 24 MAR 1982. FORWARDED TO DAEN-CWE-B FOR REVIEW AND APPROVAL. **DAEN-CWE-BB (11 AUG 81) 4TH IND DATED** **19 MAY 1982. APPROVED SUBJECT TO COMMENT.**

Table 1 (continued)
BROWARD COUNTY, FLORIDA
SUMMARY OF BEACH EROSION CONTROL PROJECTS

REPORT	WORK	APPROVAL
SEGMENT II, HILLSBORO INLET TO PORT EVERGLADES (continued)		
JANUARY 1982. **ADDENDUM I (COST APPORTIONMENT ECONOMIC ANALYSIS) TO GENERAL DESIGN MEMORANDUM FOR SEGMENT II OF BROWARD COUNTY**	ADDENDUM TO COST APPORTIONMENT SECTION OF APPENDIX 4, PARAGRAPHS 46 - 50. REVISION BASED ON PRESENT RIPARIAN OWNERSHIP, LOCATION OF THE EROSION CONTROL LINE, AND PRESENT PUBLIC ACCESS.	SAME AS ABOVE. DAEN-CWE-BB (11 AUG 81) 4TH IND DATED 19 MAY 1982. APPROVED SUBJECT TO COMMENT.
APRIL 1993, REVISED APRIL 1994. BROWARD COUNTY, FLORIDA, **HILLSBORO INLET TO PORT EVERGLADES (SEGMENT II) SHORE** PROTECTION PROJECT, REEVALUATION **REPORT, SECTION 934 STUDY WITH ENVIRONMENTAL ASSESSMENT**	EVALUATION OF ECONOMIC JUSTIFICATION OF EXTENDING FED PARTICIPATION IN THE COST OF FUTURE NOURISHMENTS OF SEGMENT II (11.5 MILES OF SHORELINE).	CECW-PE, MEMORANDUM DATED 9 JUN 1995. **APPROVED SECTION 934 REPORT FOR TECHNICAL ADEQUACY, BUT PROJECT LIFE WAS NOT EXTENDED.** (NOURISHMENT WAS NOT SCHEDULED BEFORE THE END OF FY 95, AND THEREFORE, FEDERAL PARTICIPATION WAS NOT EXTENDED.)
SEGMENT III, PORT EVERGLADES INLET TO SOUTH COUNTY LINE		
March 1975. **BROWARD COUNTY STATE PARK** BEACH RESTORATION PROJECT **(JOHN U. LLOYD STATE PARK)**	INITIAL CONSTRUCTION. 1,090,000 CUBIC YARDS OF SAND WAS PLACED ALONG A 1.5 MILE REACH JUST SOUTH OF PORT EVERGLADES INLET IN 1976.	DAEN-CWE-B, 2ND IND [DATED APRIL 1975(?)]. APPROVED FOR CONSTRUCTION.
JUNE 1978, REVISED OCTOBER 1978. **GENERAL AND DETAIL DESIGN MEMORANDUM, BROWARD COUNTY,** PORT EVERGLADES TO SOUTH COUNTY LINE (SEGMENT III), BEACH EROSION CONTROL PROJECT **(HOLLYWOOD/HALLANDALE)**	BEACH NOURISHMENT. 1,980,000 CUBIC YARDS OF SAND WAS PLACED ALONG A 5.2 MILE REACH IN 1979. BALBOA STREET, HOLLYWOOD, FL, SOUTH TO THE BROWARD-DADE COUNTY LINE.	DAEN-CWE-BB (SAJEN-RC/8 DEC 78) 2ND IND DATED 30 APRIL 1979, SUBJECT TO COMMENTS. APPROVED GDM.

Table 1 (continued)
BROWARD COUNTY, FLORIDA
SUMMARY OF BEACH EROSION CONTROL PROJECTS

REPORT	WORK	APPROVAL
JUNE 1986, REVISED JANUARY 1987. **GENERAL DESIGN MEMORANDUM, ADDENDUM I. BEACH EROSION** CONTROL PROJECT, BROWARD CO FLORIDA, PORT EVERGLADES TO SOUTH COUNTY LINE (SEGMENT III). **(JOHN U. LLOYD STATE PARK)**	WORK NECESSARY FOR THE FIRST RENOURISHMENT OF JOHN U. LLOYD STATE BEACH RECREATION AREA. SAND TIGHTENING OF THE SOUTH JETTY OF PORT EVERGLADES AND PLACEMENT OF 603,000 CUBIC YARDS OF SAND ON A 1.5 MILE REACH SOUTH OF THE JETTY IN 1989.	SADEN-G (SAJEN-HC/6 APR 87) 1ST END DATED 14 MAY 1987. APPROVED GDM ADDENDUM I.
REVISED OCTOBER 1990. GENERAL **DESIGN MEMORANDUM, ADDENDUM II,** SHORE PROTECTION PROJECT, **SEGMENT III, (PORT EVERGLADES TO** SOUTH COUNTY LINE), BROWARD COUNTY, FLORIDA. **(HOLLYWOOD/HALLANDALE - FIRST RENOURISHMENT)**	RENOURISHMENT OF THE 5.25 MILE REACH OF HOLLYWOOD/HALLANDALE. 1,109,000 CUBIC YARDS OF SAND WAS PLACED ON A 5.25 MILE REACH IN 1991.	CESAD-PP-C (CESAJ-EN-HC/ 7 AUG 90) 1ST END DATED 3 OCT 1990. APPROVED GDM ADDENDUM II SUBJECT TO COMMENTS.
OCTOBER 1990, REVISED APRIL 1991. BROWARD COUNTY, FLORIDA, SHORE PROTECTION PROJECT, SEGMENT III, FROM PORT EVERGLADES INLET TO THE SOUTH COUNTY LINE, SECTION **934 (PL 99-662) REEVALUATION REPORT.**	JUSTIFICATION FOR EXTENDING FEDERAL PARTICIPATION IN THE COST OF THE FUTURE NOURISHMENT OF SEGMENT III (8.1 MILES) FORTY YEARS FROM 1990 THROUGH 2030.	ASA (CW) MEMORANDUM DATED 9 SEP 1992. APPROVED EXTENSION OF PROJECT LIFE BY 40 YEARS.

covers the area from Port Everglades to the South County Line with Federal participation limited to 10 years.

- Supplemental Agreement No. 1 dated June 28, 1976 was executed by the District Engineer and the Board of County Commissioners on June 28, 1976, and approved by Secretary of the Army, Director of Real Estate on July 30, 1976. This Supplemental Agreement provided for initial construction of the northern 8,000 feet of the project area (J.U. Lloyd State Park).

- Supplemental Agreement No. 2 dated May 21, 1979 was executed by the District Engineer and the Board of County Commissioners on May 21, 1979. This Supplemental Agreement provided for initial construction of the Hollywood/Hallandale portion of Segment III.

- Supplemental Agreement No. 3 dated August 21, 1987 was executed by the District Engineer and the Board of County commissioners on August 21, 1987. This Supplemental Agreement provides for periodic nourishment of J.U. Lloyd State Park and sand tightening of the south jetty of Port Everglades. The draft agreement was approved by CESAD-RE-O Memorandum dated June 18, 1987.

- Supplemental Agreement No. 4 dated December 17, 1990 was executed by the District Engineer and the Board of County Commissioners on December 19, 1990. This Supplemental Agreement provided for periodic nourishment of the Hollywood/Hallandale portion of Segment III. The draft agreement was approved by CESAD-PP-C Memorandum dated November 16, 1990.

ITEMS OF LOCAL COOPERATION

15. The authorizing document contains the following items of local cooperation, which were included in the Report of the Chief of Engineers (dated 15 June 1964). The items of cooperation from the Chief of Engineers' report are as follows:

"(a). Contribute toward the first cost of providing the recommended improvements for navigation and beach erosion control in the amount of the following percentages (exclusive of navigation aids, lands, easements, rights-of-way, and pre-project expenditures by local interests at Pompano Beach) in such manner as may be acceptable to the Chief of Engineers for construction to be performed by the Corps of Engineers, the final amount to be ascertained after actual costs have been determined:

(1) 90.5 percent of the first cost of the recommended beach erosion restoration in the reach between the north county line and Hillsboro Inlet, now estimated at $833,000;

(2) 90.0 percent of the first cost allocated to beach erosion control and 50 percent of the first cost allocated to navigation in the combined beach erosion-navigation project between Hillsboro Inlet and Port Everglades, estimated at $2,123,000 and $337,000, respectively; and

(3) 72.4 percent of the first cost of the recommended beach restoration in the reach between Port Everglades and the south county line, now estimated at $1,115,000.

(b). Provide without cost to the United States all lands, easements, and rights-of-way required for construction and subsequent maintenance of the projects and for aids to navigation upon the request of the Chief of Engineers, and suitable areas determined by the Chief of Engineers to be required in the general public interest for initial and subsequent disposal of spoil not used for beach nourishment, and necessary retaining dikes, bulkheads, and embankments therefore or the costs of such retaining works;

(c). Obtain approval of the Chief of Engineers, prior to commencement of work on a project, of detailed plans and specifications and arrangements for prosecution of work on the project, if local interest desire to construct the beach erosion features;

(d). Furnish assurances satisfactory to the Secretary of the Army that during the economic life of the project they will:

(1) Hold and save the United States free from damages that may be attributed to the construction and maintenance of the projects;

(2) Provide and maintain without cost to the United States an adequate public landing or wharf at Hillsboro Inlet with provisions for the sale of motor fuel, lubricants, and potable water, available to all on equal terms;

(3) Establish a properly constituted and competent non-profit public body empowered to cooperate financially and to provide and operate essential local facilities for navigation at Hillsboro Inlet open to all on equal terms;

(4) Control water pollution to the extent necessary to safeguard the health of bathers;

(5) Maintain continued ownership of the publicly owned shores upon which the amount of Federal participation is based and their administration for public use;

(6) Maintain all project works except the jetties at Hillsboro Inlet and the aids to navigation there, perform periodic beach nourishment, operate and maintain the floating dredge for its period of use, maintain the navigation channel at Hillsboro Inlet for the same period, and operate and maintain the sand transfer plant should it be constructed, at which time maintenance of the navigation channel would revert to the United States, subject to Federal participation as recommended herein."

16. The Chief of Engineers also recommended in the authorization document that; ”authority be granted to permit construction of the beach erosion control features of the projects by local interests, if they so desire, with subsequent reimbursement of the Federal share of the costs thereof, in addition to reimbursement of the Federal share of the costs of beach erosion control

work done by them after initiation of the survey study, provided that the work is approved by the Chief of Engineers as being in accordance with the authorized projects."

PREVIOUS PROJECT MODIFICATIONS

CHANGES TO PROJECT FEATURES

Segment II

17. The Federal shore protection project for Broward County, Florida was authorized by Section 103 of Public Law 89-298 on October 27, 1965, and is described in House Document 91-89. Initial restoration of the project segment was completed in 1970 (USACE, 1994). The restored beach included the shoreline from Northeast 5th Court in Pompano to Washington Avenue in Lauderdale-by-the-Sea (approximately 3.2 miles between R-32 through R-49) (USACE, 1994). The project extended the 1970 MHW by 134 feet (USACE, 1981). The authorized project berm elevation was set at +10 feet mean low water or +9 feet NGVD. The design slopes for the project area were one vertical (V) to 20 horizontal (H) onshore and 1V to 30H offshore. The total volume of material placed on the beach for the initial restoration was 1,076,000 cubic yards (USACE, 1994).

18. The first renourishment of this shoreline was accomplished in 1983, and included periodic nourishment of an additional 2.3 miles of Segment II (USACE, 1994). An estimated 1.9 million cy of sand was placed along 5.3 miles of the segment starting at Hillsboro Inlet (DNR monument R-26) to the north through Lauderdale-by-the-Sea to the south (DNR monument R-53) (USACE, 1994). The berm crest elevation remained +9 feet NGVD. The MHW line would be extended seaward an average of 45 feet from the existing shoreline throughout the project area (USACE, 1981). The onshore design slope was adjusted to 1V to 15H and the offshore design slope remained 1V to 30H.

Segment III

19. Previous project modifications along the authorized reaches of the Segment III shoreline include the following:

20. The source of the material as documented in the authorized project plan was located 5 to 10 miles west of the project shoreline. The material was to be hauled by truck to the project beach. It has been determined that the trucking of material in the quantities required is not economically feasible. All material placed along the Segment III shoreline has been borrowed from offshore sources.

21. The volume of material for the John U. Lloyd State Park and the Hollywood/Hallandale shorelines were modified from that indicated in the project document. No initial nourishment was indicated for John U. Lloyd in the authorized plan. In 1976-77 1,090,000 cubic yards of initial and advance nourishment was placed on the northern 7,980 feet of Segment III shoreline.

22. In 1979 construction began which resulted in the placement of 1,980,000 cubic yards of fill between monuments R-101 and R-128.

23. The authorized renourishment of John U. Lloyd State Park in 1989 placed approximately 603,400 cubic yards of material on the beach. The placed volume exceed 1987 estimates by 103,400 cubic yards due to erosion which occurred during unavoidable project delays.

24. The authorized project indicates an average berm elevation of +10 feet (MSL). Evaluation of the project beach profiles throughout Hollywood and Hallandale shows that the natural storm berm is at an elevation of approximately +7 feet NGVD; construction of a berm above this elevation would make the beach higher than the adjacent broadwalk and streets. The Hollywood/Hallandale berm elevation was modified to +7 ft NGVD.

25. The initial project authorization recommends an average restored beach width of 100 feet at MHW throughout Broward County. Specifically, the authorized project dimensions provided for a design shoreline extension of 75 to 125 feet at MHW.

26. The 1979 construction along Hollywood/Hallandale resulted in a temporary shift of the mean high water shoreline averaging 178 feet seaward of the ECL. The 1,980,000 cubic yard construction volume included five years of advance nourishment. Adjusted slopes were 1V to 15H from the crest of the berm to mean low water, and 1V to 30H from this point seaward to intersect with the existing bottom. The authorized slope from the berm crest to MLW is 1V to 20H, and 1V to 30H from this point seaward to intersect with existing bottom.

27. The 1976-77 placement of 1,090,000 cubic yards of sand in John U. Lloyd State Park resulted in a construction section extending an average 140 feet at MHW.

28. The original authorized project did not include sand-tightening of the Port Everglades Entrance south jetty. In 1989, following the analysis of dye studies indicating that sand was penetrating the south jetty at ebb tide when incident waves were from the southeast, the jetty was grouted along the landward most 700 feet of its length to reduce porosity.

CHANGES TO ITEMS OF COOPERATION

Segments II and III

29. The current items of local cooperation are presented below:

(a). Provide 35 percent of initial project costs and periodic nourishment costs assigned to hurricane and storm damage reduction, 50 percent of the initial project costs and periodic nourishment costs assigned to recreation, 100 percent of initial project costs and periodic nourishment costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits as further specified below:

(1). Provide all lands, easements, and rights-of-way, and perform or ensure the performance of any relocations determined by the Federal Government to be

necessary for the initial construction, periodic nourishment, operation, and maintenance of the project;

(2). Provide, during construction, any additional amounts as are necessary to make its total contribution equal to 35 percent of initial project costs assigned to hurricane and storm damage reduction, 50 percent of initial project costs assigned to recreation and 100 percent of initial project costs assigned to protecting undeveloped private lands and other private shores which do not provide public benefits.

(b). For so long as the project remains authorized, perform periodic nourishment, operate, maintain, repair, replace, and rehabilitate the completed project, or functional portion of the project, at no cost to the Federal Government, in a manner compatible with the project's authorized purposes and in accordance with applicable Federal and State laws and regulations and any specific directions prescribed by the Federal Government;

(c). Give the Federal Government a right to enter, at reasonable times and in a reasonable manner, upon property that the non-Federal Sponsor, now or hereafter, owns or controls for access to the project for the purpose of inspecting, operating, maintaining, repairing, replacing, rehabilitating, or completing the project. No completion, operation, maintenance, repair, replacement, or rehabilitation by the Federal Government shall relieve the non-Federal Sponsor of responsibility to meet the non-Federal Sponsor's obligations, or to preclude the Federal Government from pursuing any other remedy at law or equity to ensure faithful performance;

(d). Hold and save the United States free from all damages arising from the initial construction, periodic nourishment, operation, maintenance, repair, replacement, and rehabilitation of the project and any project-related betterments, except for damages due to the fault or negligence of the United States or its contractors;

(e). Keep and maintain books, records, documents, and other evidence pertaining to costs and expenses incurred pursuant to the project in accordance with the standards for financial management systems set forth in the Uniform Administrative Requirements for Grants and Cooperative Agreements to State and Local Governments at 32 Code of Federal Regulations (CFR) Section 33.20;

(f). Perform, or cause to be performed, any investigations for hazardous substances that are determined necessary to identify the existence and extent of any hazardous substances regulated under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), Public Law 96-510, as amended, 42 U.S.C. 9601-9675, that may exist in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be required for the initial construction, periodic nourishment, operation, and maintenance of the project. However, for lands that the Federal Government determines to be subject to the navigation servitude, only the Federal Government shall perform such investigations unless the Federal Government provides the non-Federal

Sponsor with prior specific written direction, in which case the non-Federal Sponsor shall perform such investigations in accordance with such written direction;

(g). Assume complete financial responsibility for all necessary cleanup and response costs of any CERCLA regulated materials located in, on, or under lands, easements, or rights-of-way that the Federal Government determines to be necessary for the initial construction, periodic nourishment, operation, or maintenance of the project;

(h). Agree that the non-Federal Sponsor shall be considered the operator of the project for the purpose of CERCLA liability, and to the maximum extent practicable, operate, maintain, and repair the project in a manner that will not cause liability to arise under CERCLA;

(i). If applicable, comply with the applicable provisions of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970, Public Law 91-646, as amended by Title IV of the Surface Transportation and Uniform Relocation Assistance Act of 1987 (Public Law 100-17), and the Uniform Regulations contained in 49 CAR Part 24, in acquiring lands, easements, and rights-of-way, required for the initial construction, periodic nourishment, operation, and maintenance of the project, including those necessary for relocations, borrow materials, and dredged or excavated material disposal, and inform all affected persons of applicable benefits, policies, and procedures in connection with said Act;

(j). In the exercise of their respective rights and obligations under this Agreement, the Non-federal Sponsor and the Government agree to comply with all applicable Federal and State laws and regulations, including, but not limited to, Section 601 of the Civil Rights Act of 1964, Public Law 88-352 (42 U.S.C. 2000d), Department of Defense Directive 5500.11 issued pursuant thereto, as well as Army Regulation 600-7, entitled "Nondiscrimination on the Basis of Handicap in Programs and Activities Assisted or Conducted by the Department of the Army" and all applicable federal labor standards requirements including, but not limited to, 40 U.S.C. 3141-3148 and 40 U.S.C. 3701-3708 (revising, codifying and enacting without substantive change the provisions of the Davis-Bacon Act (formerly 40 U.S.C. 276a *et seq*.), the Contract Work Hours and Safety Standards Act (formerly 40 U.S.C. 327 *et set*.) and the Copeland Anti-Kickback Act (formerly 40 U.S.C. 276c)).

(k). Provide the non-Federal share of that portion of the costs of mitigation and data recovery activities associated with historic preservation that are in excess of 1 percent of the total amount authorized to be appropriated for the project, in accordance with the cost sharing provisions of the agreement;

(l). Participate in and comply with applicable Federal floodplain management and flood insurance programs;

(m). Do not use Federal funds to meet the non-Federal sponsor's share of total project costs unless the Federal granting agency verifies in writing that the expenditure of such funds is authorized;

(n). Prescribe and enforce regulations to prevent obstruction of or encroachment on the project that would reduce the level of protection it affords or that would hinder future periodic nourishment and/or operation and maintenance of the project;

(o). Not less than once each year, inform affected interests of the extent of protection afforded by the project;

(p). Publicize floodplain information in the area concerned and provide this information to zoning and other regulatory agencies for their use in preventing unwise future development in the floodplain, and in adopting such regulations as may be necessary to prevent unwise future development and to ensure compatibility with protection levels provided by the project;

(q). For so long as the project remains authorized, the non-Federal Sponsor shall ensure continued conditions of public ownership and use of the shore upon which the amount of Federal participation is based;

(r). Provide and maintain necessary access roads, parking areas, and other public use facilities, open and available to all on equal terms;

(s). Recognize and support the requirements of Section 221 of Public Law 91-611, Flood Control Act of 1970, as amended, and Section 103 of the Water Resources Development Act of 1986, Public Law 99-662, as amended, which provides that the Secretary of the Army shall not commence the construction of any water resources project or separable element thereof, until the non-Federal sponsor has entered into a written agreement to furnish its required cooperation for the project or separable element; and

(t). At least twice annually and after storm events, perform surveillance of the beach to determine losses of nourishment material from the project design section and provide the results of such surveillance to the Federal Government.

(u). Control water pollution to the extent necessary to safeguard the health of bathers;

(v). Obtain approval of the Chief of Engineers, prior to commencement of work on a project, of detailed plans and specifications and arrangements for prosecution of work on the project.

PROJECT SPONSORSHIP

Segments II and III

30. No changes have been made in project sponsorship over the life of the project. The sponsor is the Board of County Commissioners, Broward County, Florida.

OTHER FEDERAL PROJECTS

PORT EVERGLADES

31. Port Everglades is a man-made inlet initially constructed in 1926 and designated as a Federal project in 1931. The port is located in Broward County approximately 13 miles south of Hillsboro Inlet and 13 miles north of Bakers Haulover Inlet. Port Everglades is bounded by the city of Fort Lauderdale to the north and John U. Lloyd State Park to the south. The port is considered a major deep draft commercial and cruise ship port ranking second in the State and sixth on the Atlantic Coast based upon tonnage in 1987 (COE, 1991).

32. Since 1984, Port Everglades has been maintained with an outer channel depth of 47 feet MLW and a width of 500 feet. The Federal navigation project begins at an interior turning basin connecting the Atlantic Intracoastal Waterway and extends approximately 0.8 miles offshore. Prior to its current state, Port Everglades has undergone five major improvement projects detailed as follows.

33. The original jetties placed at the entrance were circular, steel sheet-pile structures (Coastal Tech., 1994; after Marino and Mehta, 1986). Parallel limestone jetties replaced the original sheet-pile jetties in 1931. After the jetties were installed the channel was 35-feet deep and the entrance measured 210-feet wide by 7,300-feet long. The limestone was replaced with granite in 1940, and the entrance was widened to 500-feet at the seaward end of the jetties. In 1962, the channel was deepened to about 40-feet and approximately 2 million cubic yards of material was dredged for the project. This material was spoiled north of the channel, approximately 2,000 feet offshore (Coastal Tech, 1994). This spoil shoal is a prominent feature of the modern, nearshore bathymetry and is believed to significantly influence nearshore hydrodynamics in its vicinity. The channel was widened and the north jetty realigned in 1981-1984. Finally, in conjunction with a beach nourishment project south of the inlet, the south jetty was grouted in 1989 for sand-tightening purposes.

34. The configuration of the north jetty and shore-perpendicular nearshore spoil shoal combined with the deep navigation channel has made the inlet a complete littoral barrier to the southerly transport of sediment. Fort Lauderdale has been accreting due to the impoundment of sand at the north jetty, and the beaches along John U. Lloyd have been eroding due to the sediment deficit caused by the inlet.

PRIOR NON-FEDERAL CORRECTIVE ACTION

HILLSBORO INLET SAND BYPASSING

35. Mechanical sand bypassing of Hillsboro Inlet to Pompano Beach has had positive impacts on the Pompano Beach – Fort Lauderdale segment. Material is mechanically bypassed around Hillsboro Inlet to Pompano Beach, and the rate has increased since the mid-1980's (see Table A-7 in Appendix A). The bypassing rate for 1989 - 1998 (134,300 cy/yr) is more than double the 1979 – 1988 (64,800 cy/yr) rate. This rate is maintaining northern Pompano Beach while it was erosional in prior decades. As a result of sand bypassing, no periodic nourishment is required at this time in northern Pompano Beach.

HALLANDALE BEACH FILL

36. The City of Hallandale first nourished the southernmost 4,000 feet of the Broward County shoreline in 1971. The completely non-Federally funded project restored this portion of the Hallandale shoreline by placing 350,000 cubic yards of material dredged from borrow sites located 4,000 to 6,000 feet directly offshore. Pre- and post construction surveys were not specifically undertaken for these projects. As such, neither specific trends nor localized response are readily judged from the available data. However, surveys taken in 1977 indicate that the majority of the upland beach area restored by the fill had since eroded, and that most of the seawalls in the area were exposed to wave attack during normal tides.

EXISTING COASTAL STRUCTURES

Segment II

37. The majority of the upland development of Pompano Beach, Lauderdale-by-the-Sea, and Fort Lauderdale are protected by structures. Approximately 69% of the properties contain structures (USACE, 1996). The primary structures are low seawalls protecting private development with a setback from the water's edge (Appendix A). However, nearly a mile of Segment II is protected by seawalls over 10 feet in height. The improvements made to Highway A1A in Fort Lauderdale in the late 1990's added a small wall along the landward edge of the beach, increasing the seawall length by 8,150 feet. Since the wall is built only on a spread footer, it provides little protection against beach erosion and storm recession. Two derelict groins were identified near R-40 in Pompano during a February 2000 field inspection. One groin (the remnants of the New River Inlet jetties) is located near R-79 in southern Fort Lauderdale. Two fishing piers exist within the project area.

Segment III

38. An inventory of existing coastal structures was performed via review of aerial photography and site inspection in August 1999. The coastal structures in the segment are composed almost entirely of seawalls. The walls vary in size from small retaining walls along the Hollywood shoreline to large structural seawalls along the Hallandale shoreline. The largest seawalls are approximately 10 feet in height. Other structures include the south jetty at Port Everglades and a bulkhead with toe protection at the Naval Surface Warfare Center. At the time of inspection, the seawalls were fronted by sand, and an assessment of toe protection measures was not possible. It has been reported that portions of the hook groin in southern Hollywood remains in water depths of about 5 feet. One fishing pier exists within the project area.

PROJECT DESIGN AND ECONOMIC EFFICIENCY

39. Principles and Guidelines. The guidance provided by the "Economic and Environmental Principles and Guidelines for Water and Related Land Resources Implementation Studies" (The Principles and Guidelines, or P&G) is used by Federal agencies involved in water resource development. Although each project and project setting presents unique problems and opportunities, the U.S. Army Corps of Engineers applies a consistent set of decision criteria to participation in project planning and construction. There are three basic criteria:

(1) That there be an economically justified and environmentally acceptable project. Widespread use of benefit to cost analysis as a test of a project's economic worth is generally considered to have grown out of the Flood Control Act of 1936. In this Act, Congress required that the U.S. Army Corps of Engineers recommend a project only "if the benefits to whomsoever they may accrue are in excess of the estimated costs and if the lives and social security of people are otherwise adversely affected." If there is an economically justified project, decisions on whether and to what extent there should be Federal participation are guided by a concept of the Federal interest that has evolved from legislation, from precedent in project authorization and construction, and from Administration budget priorities.

(2) Federal participation must be otherwise warranted. Federal participation is limited in circumstances where there are special and local benefits which accrue to a limited number of identifiable beneficiaries. The Federal government does not participate in facilities which produce outputs incidental to basic project purposes.

(3) The project must meet current Administration budget priorities. The Administration does not budget for a project unless a significant proportion of the project outputs have a high budget priority.

FEDERAL OBJECTIVE

40. The Federal objective, as stated in the P&G, is to contribute to national economic development (NED) consistent with protecting the Nation's environment, pursuant to national environmental statutes, applicable executive orders, and other Federal planning requirements. In other words, economic benefits to the Nation must exceed project costs, without unnecessary sacrifice of environmental resources. Federal planning concerns other than economic include environmental protection and enhancement, human safety, social well being, and cultural and historic resources. Environmental and safety considerations are of prime importance. In developing project modifications or proposed new projects, the U.S. Army Corps of Engineers:

a. provides for full consideration of measures to protect, enhance and restore ecological, aesthetic, historical and cultural resources;

b. attempts to obtain the best available information on the environmental effects of plans through an exchange of views and information with resources agencies at all levels of government, affected interests and the public;

c. provides equal consideration throughout planning for environmental, economic, social, financial and engineering factors in plan scoping, development, evaluation and modification of the authorized projects or new proposed projects, and;

d. attempts to minimize adverse environmental effects, including irreversible commitments of resources, and to mitigate unavoidable losses to the extent appropriate, concurrent with project construction.

41. Federal Environmental Objectives. The U.S. Army Corps of Engineers complies with all environmental laws and executive orders. The U.S. Army Corps of Engineers considers

carefully and seeks to balance the environmental and development needs of the Nation in full compliance with the National Environmental Policy Act of 1969 (NEPA) and other authorities provided by Congress and the Executive Branch. Alternative means of meeting competing demands generated by human water resources needs are examined and their environmental values examined fully, along with the economic, engineering and social factors.

42. Public participation is encouraged early in the planning process to define environmental problems and elicit public expression of needs and expectations. Municipal, county, state and other Federal agencies are contacted early for their views and provided timely information before making recommendations. Significant environmental resources and values that would likely be impacted, favorably as well as adversely, by alternatives being considered are identified early in the planning process. All plans are formulated to avoid to the fullest extent practicable any adverse impact on significant resources.

43. Those significant adverse impacts that cannot be avoided are mitigated as required by Section 906(d) of the Water Resources Development Act of 1986. Section 906(d) requires the Secretary of the Army to include in reports submitted to Congress for authorization of construction a specific plan to mitigate fish and wildlife losses or a determination that the project will have a negligible effect on fish and wildlife. The NEPA document in this report describes the environmental impacts of the plan recommended herein and summarizes compliance with the Federal statutes and regulations.

44. Participation in shore protection projects is limited to beach restoration and protection, not beach creation or improvement unless such improvement is needed for engineering purposes. The term "restoration" was substituted for "improvement" in the amendment of July 28, 1956 (P.L. 826, 84th Congress, 70 Stat. 702) so that the basis for Federal concern became "restoration and protection" as opposed to creation of new lands (House Report No. 2544 and Senate Report No. 2691, 84th Congress). Accordingly, Federal participation in restoration is limited to the historic shoreline. It does not provide for Federal cost apportionment in extending a beach beyond its historic shoreline unless required for protection of upland areas.

45. In addition, the Federal cost share is reduced proportionately to the extent that a project protects private shores from beach erosion and land loss. Section 103(d) of the 1986 Water Resources Development Act specifically prohibits Federal participation in project costs assigned to benefits to privately owned shores, where use of such shores is limited to private interests, or to prevention of losses of private lands.

46. Federal Project Purposes. Shore protection projects have been authorized for a variety of purposes: beach erosion control, shore/shoreline protection, hurricane/hurricane wave protection and storm protection. The WRDA of 1986 now assigns costs of Federal projects to appropriate project purposes. The cost of constructing projects or features for shore protection are assigned to either storm damage reduction or recreation. Projects which provide hurricane and storm damage reduction are assigned a 65 percent Federal share. Non-separable project reaches which provide recreation output are assigned a 50 percent Federal share. Projects which provide for separable recreation are not Federally cost shared. The Federal Government does not cost share in construction of recreation facilities at shore protection projects.

47. Recreation is not considered to be high priority output or primary project output under current Department of Army policy. This policy precludes use of Federal funds to support construction of storm damage reduction or hurricane protection projects which depend on separable recreation benefits for economic justification, or for which incidental recreation benefits are greater than 50% of the total benefits unless the project is economically justified based on primary outputs alone, or based on the combination of primary benefits and an equivalent amount of incidental recreation benefits.

48. Additional Federal Objectives. The general Federal objectives dealing primarily with broad planning guidelines are described above. Other general study objectives assure that any new project recommended for construction, or proposed modifications to existing hurricane and storm damage reduction projects are formulated to:

a. meet the specific needs and concerns of the general public within the project area;
b. be part of or developed in conjunction with a "systems approach." Alternative plans that consider a broad range of possible impacts including impacts that occur on larger scale were developed. The combined effectiveness and economic efficiency of the shore protection, navigation maintenance and dredged material disposal programs can then be optimized;
c. respond to expressed public desires and preferences;
d. be flexible to accommodate changing economic, social, and environmental patterns and changing technologies;
e. integrate with and be complementary to other related programs in the project area, and;
f. be implementable with respect to financial and institutional capabilities and public consensus.

49. Four accounts are established to simplify evaluation and display of effects of alternative plans. These four accounts encompass all significant effects of a plan on the human environment as required by the NEPA. They also encompass social well-being as required by Section 122 of the 1970 Flood Control Act. The national economic development account is included since it is the primary Federal objective. Other information that is required by law or that will have a material bearing on the decision-making process is included in the other accounts listed below:

a. National Economic Development (NED). This account displays changes in the economic value of the national output of goods and services.

b. Environmental Quality (EQ). This account displays non-monetary effects on significant natural and cultural resources.

c. Regional Economic Development (RED). This account registers changes in the distribution of regional economic activity that result from project construction. Evaluations of regional effects are to be carried out using nationally consistent projections of income, employment, output, and population.

d. Other Social Effects (OSE). This account registers project effects from perspectives that are relevant to the planning process, but are not reflected in the other three accounts.

50. A plan that reasonably maximizes net NED benefits, consistent with the Federal objective, is the goal of the Federal optimization process. This plan will be identified as the NED plan. The NED plan must also meet the test of four additional criteria:

a. Completeness. The extent to which a given modification of the authorized project provides and accounts for all necessary investments or other actions to ensure the realization of storm damage reduction.

b. Effectiveness. The extent to which a given modification of the authorized project contributes to a solution to the shoreline erosion and storm damage problems and achieves protection from storm damages.

c. Efficiency. The extent to which a given modification of the authorized project is the most cost effective means of providing storm damage protection, consistent with protecting the Nation's environment.

d. Acceptability. The viability of a given modification to the authorized project and its acceptance by the non-Federal project sponsor, state entities and the public, and compatibility with existing laws, regulations, and public policies.

STATE OF FLORIDA'S OBJECTIVE

51. Coastal Management Program: Florida's Coastal Management Program was established under the Coastal Management Act of 1978 (Florida Laws, Ch. 380) and approved by the Federal Coastal Zone Management office in 1981 (Pilkey et al., 1984). Florida does not regulate its coastal zone through one comprehensive law, but rather through 25 state statutes. The Florida Department of Environmental Protection (FDEP) is the lead state agency which regulates coastal development. Within the FDEP, the Office of Beaches and Coastal Systems plays a key role in the coastal management program.

52. Beach and Shore Preservation. The Beach and Shore Preservation Act (Ch. 161) is Florida's primary statute for regulating coastal development. The act, which is administered today by the Florida Department of Environmental Protection (FDEP), Office of Beaches and Coastal Systems (OB&CS), was first passed in 1965 and has since been significantly amended (Florida Atlantic University, 1986). In the act, the legislature asserted that Florida's beaches and coastal barrier dunes are among the state's most valuable natural resources and that these resources should be protected from "imprudent construction which can jeopardize the stability of the beach-dune system, accelerate erosion, provide inadequate protection to upland structures, endanger adjacent properties or interfere with public beach access" (161/053).

53. Coastal Construction Control Lines. To ensure that such "imprudent construction" does not take place, the statute charges the FDEP to define and establish Coastal Construction Control Lines (CCCL). These lines define the landward limit of the active beach-dune system and vary from a few to several hundred feet inland of mean high water. The specific location of the line is a function of the predicted storm surge and erosion resulting from a 100-year storm.

54. Erosion Setbacks. The 1985 State Comprehensive Growth Management Act (Ch. 85-55) amended the Beach and Shore Preservation Act to include a construction setback provision for all sandy beach counties. The amendment prohibits the FDEP from granting most coastal construction permits on land that will be seaward of the seasonal high water line within 30 years (161/053). The 30-year erosion projection cannot, however, extend landward of an established CCCL (161/053).

55. Coastal Building Zone. The 1985 Growth Management Act further amended the Beach and Shore Preservation Act to establish a coastal building zone extending landward of CCCLs. Within the coastal building zone, strict building codes ensure that all major structures are designed and constructed to withstand the forces of and erosion caused by a 100-year storm event (Florida Atlantic University, 1986).

56. Erosion Control Program. Guidelines have been provided by the State of Florida Department of Environmental Protection which document criteria and procedures for participation in a comprehensive, long-range, statewide beach management plan for erosion control measures pursuant to Sections 161.088, 161.091, 161.101**,** and 161.161 of the Florida Statutes. The legislature declared, "beach erosion is a serious menace to the economy and general welfare of the people of this state and has advanced to emergency proportions." Correspondingly, the legislature concluded that state management was necessary to ensure that Florida's beaches were properly managed and protected (161.088).

57. State funds for erosion control projects are available from Florida's Erosion Control Trust Fund (161.091). The fund provides money for erosion control; hurricane protection; and beach preservation, restoration, and renourishment projects (161.091). The state can pay up to 50% of the actual cost of restoring a critically eroding beach, while the local government in which the project occurs must provide the balance of the funds (161.101). State support for locally sponsored projects has largely been for beach restoration and renourishment and, to a lesser extent, dune restoration, revegetation, and dune walkovers (Florida Atlantic University, 1986).

58. Erosion Control Line. Property rights of State and private upland owners in beach restoration project areas are set forth in Florida Statute 161.141. The statute proclaims that the Legislature hereby declares that it is the public policy of the state to cause to be fixed and determined, pursuant to beach restoration, beach renourishment, and erosion control projects, the boundary line between sovereignty lands of the state bordering on the Atlantic Ocean, the Gulf of Mexico, or the Straits of Florida, and the bays, lagoons, and other tidal reaches thereof, and the upland properties adjacent thereto; except that such boundary line shall not be fixed for beach restoration projects that result from inlet or navigation channel maintenance dredging projects unless such projects involve the construction of authorized beach restoration projects.

59. Inlet Management. In order to manage the erosion of adjacent beaches as a result of improved navigational inlets, Florida Legislature passed the Declaration of public policy relating to improved navigation inlets (161/142). In this statute the Legislature hereby recognizes the need for maintaining navigation inlets to promote commercial and recreational uses of our coastal waters and their resources. The Legislature further recognizes that inlets alter the natural

drift of beach-quality sand resources, which often results in these sand resources being deposited around shallow outer-bar areas instead of providing natural nourishment to the downdrift beaches. Therefore:

a. All construction and maintenance dredgings of beach-quality sand should be placed on the downdrift beaches; or, if placed elsewhere, an equivalent quality and quantity of sand from an alternate location should be placed on the downdrift beaches.

b. On an average annual basis, a quantity of sand should be placed on the downdrift beaches equal to the natural net annual longshore sediment transport.

c. The provisions of subsections (1) and (2) shall not be a requirement imposed upon ports listed in s.403.021(9)(b). Erosion control of downdrift beaches must also be balanced with the importance of maintaining the water depths needed to conduct deepwater commercial navigation in the channels, ports and turning basins of Florida. This premise was set forth in Florida Statute 403.021.9(a) and 9(b).

a. 9(a). The Legislature finds and declares that it is essential to preserve and maintain authorized water depth in the existing navigation channels, port harbors, turning basins, and harbor berths of this state in order to provide for the continued safe navigation of deepwater shipping commerce. The department shall recognize that maintenance of authorized channel depths is an ongoing, continuous, beneficial, and necessary activity; and it shall develop a regulatory process which shall enable the ports of this state to conduct such activities in an environmentally sound, expeditious, and efficient manner.

b. 9(b). The provisions of paragraph (a) apply only to the port waters, spoil disposal sites, port harbors, navigation channels, turning basins, and harbor berths used for deepwater commercial navigation in the ports of Jacksonville, Tampa, Port Everglades, Miami, Port Canaveral, Ft. Pierce, Palm Beach, Port Manatee, Port St. Joe, Panama City, St. Petersburg, and Pensacola.

60. Local Comprehensive Planning. The Local Government Comprehensive Planning Act of 1975 (Ch. 163) requires that all local governments prepare, adopt, and implement comprehensive plans that address community growth and development needs (Pilkey et al., 1984). In the 1985 Growth Management Act, the Florida legislature strengthened the Planning Act in coastal areas and required that local, regional, and state comprehensive plans be consistent with each other. Under the Planning Act, coastal localities must include a "coastal management element" in their local plans (Godschalk et al., 1989). This section of the plan must be based on an inventory of the beach-dune system and existing coastal land uses and an analysis of the effects of future land uses on coastal resources (Florida Atlantic University, 1986).

EVALUATE EFFECTS OF THE PROPOSED PROJECT MODIFICATIONS

NO ACTION PLAN

61. The no future action plan to address the continued erosion of the Segment II and Segment III shorelines will result in shoreline recession and loss of the previously constructed design beach sections. This, in-turn, would result in the loss of valuable upland infrastructure and property. There is an estimated $1.9 billion and $562 million in Segments II and III respectively in structural improvements within the first two rows of oceanfront development.

62. In addition to economic losses, the no action plan would lead to the loss of marine sea turtle nesting habitat along the Broward County shoreline. The sand nourishment of the County's shorelines maintains a sandy beach suitable for marine sea turtle nesting. Continued shoreline recession would degrade the condition of the beach and ultimately expose seawalls and revetments along a large portion of the Broward County shoreline. Due to the expected economic and habitat losses associated with the no-action plan, the local sponsor (Broward County) has elected to pursue renourishment of the Segment II and III shorelines.

63. The optimization of project features was achieved through a three-step process. These three steps were:

a. Preliminary assessment of the authorized plan and the recommendations presented in the authorizing document. Costs and benefits are not computed in this step.

b. Intermediate-level-of-detail development and assessment of project features. Unit price cost estimates and benefits are computed. Includes general discussion of potential environmental impacts.

c. Development and assessment of detailed plan. Cost code of account level cost estimates are computed, including the costs of lands, easements, rights-of-way and mitigation. Detailed benefits are computed. Federal and non-Federal cost allocation is discussed. Includes assessment of environmental impacts.

64. The economic analysis to determine the NED plan for the project area includes an inventory of potential damages, development of project features, and estimation of project implementation costs. Monetary values are expressed in average annual equivalents (AAE) by appropriate discounting and annualizing techniques using the applicable discount rate (6.625 percent). For the purposes of this study, the 50-year period of analysis is used for all alternative plans. The period of analysis does not include the implementation or construction period (the period prior to the base year). All benefits and costs are expressed as of the beginning of the base year. The following steps are taken in the economic analysis:

a. assess the extent of potential property damage for the future without project condition through analysis of storm induced shoreline recession and wave damage, assess the loss of recreation, and assess the loss of land,

b. determine storm damage reduction benefit for various project features, and

c. evaluate all beneficial and adverse impacts for each project feature in accordance with Engineer Regulation 1105-2-100 (Principles and Guidelines).

65. The above criteria were used to reevaluate the authorized features of the shore protection project for Broward County according to the study guidelines and objectives. Modification to existing and/or inclusion of additional project features was considered. The project feature optimization process assures that all possible alternative project features are considered in a systematic and reasonable manner.

REEVALUATED NED PLAN

Segment II

66. Project Length. The authorized Federal project extends 5.4 miles from FDEP monuments R-25 to R-53 and includes the entire shorelines of Pompano Beach, and Lauderdale-by-the-Sea.

67. Berm Elevation. The design berm elevation is +9.0 feet NGVD. This elevation is consistent with the berm elevations along the existing beach.

68. Berm Width. The reevaluation is based on the existing project not being in place, that is all dredged sand is back in the original borrow areas and the project life is 50 years. Assuming 1970 conditions, the reevaluated NED plan is a 100-ft extension of the ECL/baseline (Appendix C).

69. Beach Slopes. The onshore and offshore beach slopes for Segment II are 1V:15H and 1V:30H, respectively.

70. Fill Volume. In order to construct the NED plan, approximately 3,412,000 cubic yards of sand would be necessary to construct the initial nourishment (Appendix A). The project would cover an estimated 12.2 acres of hardbottom (Appendix A).

71. Project Costs. Using an interest rate of 6 and 1/8 percent the annualized cost of building the NED plan under pre-project conditions and maintaining the 100-ft design width for 50 years, the life of the project, is $3,984,000 (Appendix A). This cost is based on a renourishment interval of 5 years.

72. Project Benefits. The annualized total benefits of constructing the NED plan is $34,191,000 which yields a benefit to cost ratio of 8.6 to 1.0 (Appendix C).

Segment III

73. Project Length. The authorized Federal project in Segment III includes two reaches of shoreline between Port Everglades and the Broward/Dade County Line. These include the 8,100 feet of shoreline for the Port Everglades south jetty to about R-94 and the 27,500 feet of shoreline from about R-101 to the Broward/Dade County Line (R-128). The north terminus of

the fill will abut the Port Everglades south jetty. The southern terminus will taper to the natural beach grade at the Broward/Dade County Line.

74. Berm Elevations. The design berm elevation varies along the Segment III project shoreline to approximate the natural berm elevation along the existing beach. Along the John U. Lloyd State Park shoreline between the south jetty of Port Everglades and R-94, the design berm elevation is +10 feet NGVD. The design berm elevation for the Hollywood/Hallandale shoreline reach is +7 ft NGVD.

75. Berm Widths. The reevaluation is based on the existing project not being in place, that is all dredged sand is back in the original borrow areas and the project life is 50 years. Assuming 1976 conditions, the reevaluated NED plan is a 50-ft extension of the pre-project mean high water shoreline (Appendix D). The Segment III pre-project shoreline is assumed to be represented by the established Erosion Control Line (ECL).

76. Beach Slopes. The design beach slopes vary along the Segment III shoreline. Design beach slopes along the northern John U. Lloyd shoreline reach are 1:10 and 1:30 above and below the mean low water elevation, respectively. Along the Hollywood/ Hallandale shoreline reach, the design beach slopes are 1:10 and 1:45 above and below the mean low water elevation, respectively. These beach slopes are generally equivalent to the trend of the beach profile shape above and below the mean low water line.

77. Fill Volume. Construction of the 50-ft design beach section with the required advance fill volume would require approximately 2,161,660 cubic yards of sand. Future nourishment volumes would be based upon the measured shoreline volume change rate of approximately 130,000 cubic yards per year. The most cost effective maintenance of the project would include sand renourishment every six years

78. Project Costs. It is estimated that the unit cost for sand for the initial construction in 1976 was $6.62 per cubic yard. This is based upon estimated costs assuming that previously used sand resources immediately offshore of Segment III are available. For the purposes of comparison, a mobilization cost of $1,000,000 is assumed for all alternatives. It is assumed that the cost of nearshore hardbottom mitigation is $300,000 per acre. This estimated is based upon actual cost of similar nearshore hardbottom mitigation in south Florida. Costs for project engineering and design, construction administration, maintenance, and project monitoring are estimated as a percentage of contract costs. A contingency of 15 percent is included for all costs estimates.

79. Using and interest rate of 6 and 1/8 percent, the annualized cost of building the NED plan under pre-project conditions and maintaining the 50-ft design for 50 years, the of the project, is $3,151,000 (see Appendix B). This cost is based upon a renourishment interval of 6 years.

80. Project Benefits. Identification of the NED plan is based upon the project alternative that produces the maximum net excess primary project benefits. Primary benefits include storm damage reduction and loss of land benefits. In the reevaluation of authorized project dimensions, benefits stemming from storm damage reduction claimed on upland development and coastal armor reflect 1976 price levels and physical conditions and an interest rate of 6 and 1/8 percent. Incidental project benefits include recreation. Average annual benefits for the 50 years of

economic life of the project were computed from the pre-construction conditions assuming with and without-project conditions.

81. The NED plan is identified as the plan that results in the greatest excess of net primary benefits. The NED plan is the 50-ft extension of the mean high water shoreline with excess annualized net primary benefits of $10,137,900. The total annualized benefits of constructing the NED plan is $26,005,300 which when compared with the aforementioned annualized project costs yields a benefit to cost ratio of 8.3 to 1.0 (see Appendix D). The following section of the report ("Implementation of the Reevaluated Plan") in conjunction with the Segment III Engineering and Economic Appendices, provides sufficient detail on the recommended plan required to proceed to the pre-construction, engineering, and design phase of the project.

IMPLEMENTATION OF REEVALUATED NED PLAN

Segment II

82. Implementation of the NED plan requires placement of fill to reconstruct the optimum design section (100 feet) and maintain the design section over the remainder of the project life. In the case of Segment II, 18 years remains of the project life. In order to minimize environmental impacts to nearshore hardbottom resources, a six-year nourishment interval is utilized.

83. Fill Volume. The design beach volume required to implement the NED plan in 2002 is 26,000 cubic yards. The design volume was determined using the design berm widths, elevation and slopes and the August 2001 beach conditions. An additional 172,000 cubic yards of advanced nourishment will be placed.

84. Project Costs. It is estimated that the unit cost of sand for the 2002 construction will be $8.50 per cubic yard and the mobilization will be $1,000,000. Due to the low annual advanced nourishment requirements and a relatively short remaining project life, local sands should be available for the remaining renourishments. The cost of nearshore hardbottom mitigation was conservatively estimated at $300,000 per acre. The total annual cost of implementing the reevaluated NED plan is $1,094,000.

85. A Consent of Use will be obtained from the State of Florida for dredging material from the borrow areas and placing sand seaward of the ECL in Segments II and III. Easements will be obtained by the County for upland properties.

Segment III

86. Evaluation of John U. Lloyd as Separable Element. The densest and most valuable shorefront development in Segment III is in Hollywood and Hallandale. Thus, these shoreline reaches generate most of the Segment III storm damage reduction benefits for the Segment III. Since Segment III was initially constructed as a continuous segment, the reevaluation treated the project as such. Thus, the John U. Lloyd reach was not evaluated as a separable element. For the purposes of implementation, however, an additional analysis was conducted to confirm that the

John U. Lloyd Reach is justified as a separable project element. This analysis included consideration of the separable costs and benefits of the John U. Lloyd reach (see Appendix D).

87. The analysis indicated that there are sufficient storm damage reduction benefits along the John U. Lloyd reach to justify sand placement at that location as a separable Segment III project element for the remaining 24-year project life. However, reestablishment and maintenance of the 50-ft NED design berm at John U. Lloyd does not maximize the separable net primary benefits along that reach. Instead, reestablishment of pre-project shoreline conditions and periodic nourishment sufficient to maintain the pre-project shoreline produces the maximum net primary benefits. Therefore, the John U. Lloyd project will only include the reestablishment of the pre-project shoreline and the placement of periodic nourishment.

88. Using and interest rate of 6 and 1/8 percent, the annualized cost to implement the John U. Lloyd reach is $1,410,000. This cost is based upon a renourishment interval of 6 years. The primary benefits for John U. Lloyd $1,028,000, which are more than 50 percent of the annualize cost. The total benefits for the reach are $2,460,000 which when compared with the aforementioned annualized project costs yields a benefit to cost ratio of 1.7 to 1.0 (see Appendix D).

89. Implementation. Implementation of the NED plan requires placement of fill to reconstruct optimum design beach section at John U. Lloyd, which is the pre-project or 0-ft shoreline, and Hollywood/Hallandale, which is the 50-ft design section, and maintain the design section over the remainder of the project life. In the case Segment III, 24 years remains in the authorized project life.

90. Fill Volume. The design beach volume required to implement the NED plan in 2002 is estimated to be approximately 576,600 cubic yards. The design volume was determined using the design berm width, elevation and slopes and August 2000 beach conditions. Berm elevations and beach slopes are identical to those identified for the reevaluated authorized project.

91. To accommodate expected sand losses over the six-year renourishment cycle 780,000 cubic yards of sand would be placed as advance fill. An additional 108,000 cubic yards of fill would be required for an overfill allowance.

92. An additional 137,300 cubic yards of sand will be incorporated into the project for the purposes of beach fill transitions at the terminal ends of the fill. The volume required for the transitions was determined through the use of the calibrated and verified GENESIS model. At the end of the fill sections, where transitions are included, various alternative taper lengths were modeled for a period equivalent to the renourishment interval. The least cost taper configuration was determined to be that which is constructed with the least amount of fill and maintains the design beach section over the interval.

93. Considering the above volume requirements, the total fill volume necessary to implement to NED plan is 1,601,900 cubic yards.

94. Project Costs. It is estimated that the unit cost for sand for the 2002 construction will be $9.79 per cubic yard. The beach nourishment costs include $1,000,000 for mobilization and

demobilization and $9.79 per cubic yard for material dredging. It is estimated that approximately 7.6 acres of nearshore hardbottom will be affected by the placement of sand associated with the implementation of the NED plan without project modifications. The cost of nearshore hardbottom mitigation is $300,000 per acre. This estimate is based upon actual cost of similar nearshore hardbottom mitigation in Palm Beach County. Cost estimates for monitoring were provided by the Broward County, Florida Department of Planning and Environmental Protection. Engineering, design, supervision and administration were based upon contract amounts agreed upon by Broward County and the joint-venture consulting engineer team.

95. Project costs required to implement the reevaluated authorized project were formulated using a percent rate of 6 and 1/8 for the remaining 24 years of the project life. The total average annual cost to implement the reevaluated plan without modifications is $4,471,000.

PROJECT MODIFICATIONS

SEGMENT II

Ft. Lauderdale

96. A separate NED plan was developed for the northern portion of Ft. Lauderdale (R-53 to R-71) and was developed as add-on to the Federal project. The project protects a major hurricane evacuation route from R-64 to R-71. The NED plan width was developed using the economic analysis described in Appendix C. This plan calls for a 20-ft extension of the baseline, which is the 1998 MHW (Plates 7-14). To construct this modification, 732,000 cubic yards of material will be needed (Appendix A). This nourishment includes 476,700 cubic yards of design fill and 256,000 cubic yards of advanced nourishment. The material will be dredged from the same borrow areas that the Federal project will utilize. This modification will cover approximately 3.0 acres of hardbottom. The annualized cost for building and maintaining the design width is $1,287,000 (Appendix A). The project life for this modification is 18 years, which is the remainder of the Federal project life. In order to minimize impacts to nearshore hardbottom resources, the renourishment interval is 6 years. This modification, alone, provides a total annualized benefit of $4,482,000, which results in a benefit to cost ratio of 3.5 to 1 (Appendix C).

97. An ECL will be set prior to construction. Land easements will be obtained from the State of Florida for dredging material from the borrow areas and placing sand seaward of the ECL. Easements will be obtained by the County for the upland properties (Appendix F).

98. The cost and benefits of the combined reevaluated and modified project in Segment II were computed in Appendices A and C, respectively. The annual cost of the NED plan is $4,155,000 and results in $34,654,000 in benefits. The benefit to cost ratio is 8.3 to 1.

SEGMENT III

99. Several modifications are evaluated for the Segment III project for the purposes of potentially identifying new project elements that would reduce overall projects. The

modifications considered include: (1) constructing a design beach through the southern end of John U. Lloyd and Dania (i.e., Dania Gap), (2) stabilizing the northern most reach of the John U. Lloyd shoreline with groins, and (3) introducing mechanical sand bypassing at Port Everglades. The physical and economic benefits of each of the potential project modifications are summarized below.

Fill Dania Gap (R-94 and R-101)

100. The previously constructed beach fills along John U. Lloyd and Hollywood/Hallandale experienced high sand loss rates at the terminal points of the fill in south John U. Lloyd and north Hollywood. End losses were particularly prominent during the first year after construction and are largely attributable to dramatic planform equilibration caused by inadequate fill transitions. The currently authorized project does not specifically include a project element that addresses the terminal ends of the fill sections. Beach fill tapers, however, have been added to the NED plan as an engineering feature for purposes of reducing the effects of fill end losses.

101. An alternative method by which to reduce end losses from the southern end of the John U. Lloyd project reach and the northern end of the Hollywood/Hallandale project reach would be to construct a continuous design section between the two projects, thereby eliminated the terminal ends of those project reaches. This would consist of placing a full design section between R-94 and R-101. Considering that the optimum design berm width along the adjacent reaches that varies between 0-ft at John U. Lloyd and 50 feet at the northern end of Hollywood, a design section tapered between 0 and 50-ft between R-94 and R-101 is considered. Berm widths of narrower or wider dimensions would require complicated transition sections.

102. Creation of a design section along this reach of shoreline would potentially produce additional storm damage reduction, loss of land, and recreational benefits for the project. Likewise, the addition of this project reach would increase the overall average annual project costs. To evaluate the economic efficiency of this proposed project modification, the incremental primary benefits and costs over the remaining 24-years of the project life are compared. If the incremental primary benefits are greater than the incremental project costs, then the modification would be economically feasible. The average annual project costs and benefits used to evaluate modifications to the reevaluated NED plan are based upon a percent rate of 6 and 1/8 for the remaining 24 years of the project life.

103. The incremental additional sand volume required to construct the design beach with advance nourishment would be approximately 360,000 cubic yards. It is estimated that a fill of these dimensions would cover about 13 acres of nearshore hardbottom in southern John U. Lloyd and Dania Beach areas.

104. Project Costs. The total average annual cost to implement the reevaluated plan with a fill section between R-94 and R-101 is $5,206,000. This results in an incremental increase in average annual project costs over implementation of the reevaluated NED plan of $735,000. The details of this cost estimate are included in Sub-appendix B-5.

105. Benefits. The total average annual incremental benefit to implement the reevaluated plan with a fill section between R-94 and R-101 is $328,000. A copy of the input file for computing the storm damage estimates along this reach of shoreline is included in Sub-appendix D-2.

106. Summary. Comparison of the incremental average annual costs and benefits for the above described project modifications yields a net average annual benefit deficit of $407,000. Thus, the incremental primary benefits do no equate to at least 50 percent of the incremental cost to implement toe additional project reach. Therefore, this project modification is not economically justified. Furthermore, the additional impact of 13 acres of nearshore hardbottom that would be associated with the project modifications is considered to be unnecessary considering the predicted performance and comparable minimal hardbottom impacts of beach fill tapers. Therefore, this project modification is not is not recommended at this time.

Groin Field In Northern John U. Lloyd

107. Modifications to the Segment III authorized project are also proposed for the northernmost shoreline along John U. Lloyd State Park. To date, only advance fill has been placed in attempt to offset the erosion rate immediate to this area. Advance fill volumes placed during the projects, however, have not provided long-term protection of the design beach section at that location. In fact, the design section along the northern 2,800 feet of the John U. Lloyd shoreline has been impacted by shoreline recession within the first two years following construction of both the 1977 and 1989 projects.

108. In addition to advance fill, a measure to reduce the sand loss rate from the northern John U. Lloyd shoreline included sand tightening the south jetty as part of the 1989 renourishment project. Although the jetty sand-tightening most likely reduced the sand loss rate to the inlet, the shoreline immediately downdrift of the inlet continued to erode more or less at historical rates. This may suggest that the sand loss rates to the inlet were relatively low compared to alongshore and offshore sand losses prior to the sand-tightening project.

109. Project configurations considered in the engineering analysis (Appendix B) intended to address the erosion problem along the northern John U. Lloyd shoreline included (1) advance fill only, (2) 2 groins with advance fill and, (3) 10 groins with advance fill. The location and quantity of advance fill for each alternative was configured to maximize protection of the design beach while minimizing the quantity of advance fill. The two-groin alternative was configured so as to stabilize the northernmost 700 feet of shoreline where the net sand transport potential is to the north. The 10-groin alternative was configured to stabilize the entire reach of shoreline defined by the largest measured shoreline recession and the steepest gradient in alongshore sand transport potential (i.e., about 2,800 feet immediate to the inlet).

110. Two Groins. The two-groin alternative would include the construction of two, rubble mound T-head groins within 700 feet of the Port Everglades south jetty and a spur attached to the south jetty. The configuration would address the shoreline instabilities associated with the net northerly sand transport potential along this reach of shoreline.

111. The total average annual cost to implement the modified reevaluated plan with tapers and two groins is $4,429,000. Project costs required to implement the reevaluated authorized project were formulated using a percent rate of 6 and 1/8 for the remaining 24 years of the project life.

112. Ten Groins. For completeness, a ten-groin alternative is also considered to extend the shore stabilizing features of a structural field throughout the most highly erosional section of shoreline. The purpose and physical benefit of the extended groin field would be to stabilize the most highly erosional section of shoreline and apply advance fill along areas of shoreline with lower net longshore sand transport potential (i.e., south of a point some 2,800 feet south of the inlet). The ten-groin alternative would include ten T-head groins placed along about 2,800 feet of shoreline and a jetty spur. The alongshore extent of the groin field was developed to be consistent with the limits of the most highly erosional section of shoreline. Stabilizing this northern reach of shoreline with T-head groins would allow the placement of advance fill beyond the direct of the influence of the inlet.

113. The total average annual cost to implement the modified reevaluated plan with tapers and ten groins is $4,432,000. Project costs required to implement the reevaluated authorized project were formulated using a percent rate of 6 and 1/8 for the remaining 24 years of the project life.

114. Although the ten-groin alternative demonstrates a net economic benefit (i.e., cost reduction) over the two-groin alternative, it is currently the position of the State of Florida's Department of Environmental Protection and Department of Parks and Recreation (the upland land owner) that structural stabilization of the northern 2,800 feet of the John U. Lloyd State Park shoreline is not in the best interest of the State and would not be permitted at this time. Nonetheless, the results of this analysis demonstrate the physical and economic benefits of this project configuration. However, without the consent of the State of Florida, this alternative cannot be considered for implementation.

Mechanical Sand Bypassing at Port Everglades

115. Cost-effective sand sources for Segment III beach renourishment will become more important in the future as nearby offshore sand deposits are depleted. One alternative future sand source is sand bypassing at Port Everglades. Although the economic benefit of sand bypassing is often related to reduced maintenance at navigation projects, sand bypassing at Port Everglades would provide both physical and economic benefits to the Segment III Federal Shore Protection Project. The results of the engineering analyses included in Appendix B demonstrate the physical benefit of sand bypassing at Port Everglades. The physical benefits would include access to a reliable future sand source that is compatible with the native sediments of the Segment III shoreline and reduced sand shoaling within the Port Everglades navigation project. These latter benefits are not considered in this analysis. The economic benefits would include an overall reduction in the cost to maintain the Segment III project.

116. Costs. The project cost associated with implementation of a sand bypass operation at Port Everglades would include the initial capital layout for the sand bypassing infrastructure, inlet jetty, shoreline and shoal modifications, and the annual cost to bypass sand and maintain the bypassing equipment. It is expected that the bypassing infrastructure would include either a

fixed or mobile plant, a dedicated pipeline installed beneath the navigation channel or Port Everglades, and numerous discharge points along the southern shoreline. For the purposes of this investigation it is assumed that annual maintenance cost are incorporated in the unit cost of bypassed sand. The cost to construct the sand-bypassing infrastructure would include the bypassing equipment and any modifications to the inlet's jetties and sand trap.

117. It is assumed that the initial cost to construct the sand-bypassing infrastructure and extend the groin field would be approximately $7,000,000. This estimate is based upon the assumption that some form of plant infrastructure would be purchased or constructed for site specific use. A more detailed evaluation of the most feasible bypassing physical plant should be conducted prior to implementation of the operation. For the purposes of this evaluation, however, this estimate is considered conservatively high compared to estimates outlined in the Port Everglades Inlet Management Plan (Coastal Tech., 1994). The unit cost of bypassed sand once the bypassing infrastructure is in place and operational is assumed to be about $3.50 per cubic yard. For the purposes and planning, it is assumed that the sand bypassing plant infrastructure and the physical benefits of sand bypassing would be available at year 6 of the analysis.

118. The total average annual cost to implement the Segment III Federal shore protection project over the remaining 24 years of the project life cycle with bypassing at Port Everglades and two groins is estimated to be $4,287,000. Including the initial cost of the bypassing infrastructure, the proposed bypassing plan with two groins at John U. Lloyd represents and average annual cost reduction of approximately $184,000 per year compared to the reevaluated NED plan. The cost reduction is due to the lower unit cost of bypassed sand compared to the expected cost of future off-site sand resources. The details of the cost estimate are included in Sub-Appendix B-6.

THE RECOMMENDED PLAN

SEGMENT II

119. It is recommended that the NED plan widths be constructed for both Pompano Beach/ Lauderdale-by-the-Sea and Ft. Lauderdale, which are a 100-ft extension of the ECL/baseline and a 20-ft extension of the baseline, respectively. The fill will be placed between FDEP monuments R-37 and R-42 and between R-51 and R-53 for Pompano Beach/ Lauderdale-by-the-Sea, and between R-53 and R-71 for Ft. Lauderdale. The construction of this project will require approximately a total of 935,000 cubic yards of material, and cost an estimated total of $14,988,000. A nearshore hardbottom mitigation project will be constructed prior to the beach nourishment project. The project is planned for construction in 2002 and would not require renourishment until 2008. The material will be dredged from five offshore borrow areas.

SEGMENT III

120. It is recommended that the NED plan beach width, a 0-ft berm (pre-project shoreline) along John U. Lloyd (R-86 to R-94) and a 50-ft extension of the ECL along Hollywood/Hallandale (R-101 to R-128) (Plates 15-29), be constructed along the previously constructed reaches of the Segment III shoreline with six years of advance nourishment. In addition to the renourishment of those shoreline reaches an engineered beach fill taper will be constructed along the northern end of the Hollywood/Hallandale reach to reduce end losses and protect the design section. A two-

groin and jetty spur structural field will also be constructed along the northern 700 feet of the John U. Lloyd shoreline to stabilize that section of shoreline and reduced sand losses to Port Everglades. This project modification is intended to stabilize a highly erosional reach of shoreline immediately adjacent to the inlet and reduce overall projects costs. The construction of this project will require a total of approximately 1,540,000 cubic yards of sand, cover approximately 7.6 acres nearshore hardbottom, and cost an estimated $24,218,000. The sand will be dredged from five offshore borrow areas. In addition, consideration of the sand shoals within Port Everglades Entrance Channel as a potential source of sand for Segment III is also warranted. A nearshore hardbottom mitigation project will be constructed prior to the beach nourishment project.

121. It is also recommended that sand bypassing be implemented at Port Everglades to provide an alternative sand source for future maintenance of the Segment III Shore Protection Project. The analysis presented herein assumes that bypassing will be available at the end of the nourishment interval for the current project (i.e., 2008). The bypassing operation would provide physical and economical benefits to Segment III of the Broward County Shore Protection Project and be consistent with current efforts to implement regional sediment at the inlet. A Design Documentation Report (DDR) will be required to evaluate the details of the infrastructure required to implement the bypassing plan. It is recommended that the DRR also be used to evaluate the need for a possible extension to the proposed groin field in order to maximize the benefits of sand bypassing. Implementation of sand bypassing at Port Everglades is expected to reduce the average annual cost of the Segment III project to about $4,287,000. This would result in an average annual cost savings of $184,000.

PLAN IMPLEMENTATION

COST ALLOCATION

122. Section 103(d) of the Water Resources Development Act of 1986 (Public Law 99-662) specifies that the cost of construction measures for beach erosion control are assigned to the appropriate purpose(s) specified in Section 103(c) of the Act. These purposes are normally hurricane and storm damage reduction and/or separable recreation. Hurricane and storm damage reduction projects are cost shared at 65 percent Federal, and separable recreation projects are cost shared at 50 percent Federal. Cost apportionment for shore protection measures must also consider shore ownership and use. Additional guidance on cost apportionment for shore protection projects is provided in Engineering Regulation 1165-2-130 dated 15 June 1989.

COST APPORTIONMENT

Segment II

123. A property by property determination of Federal participation for Segment II was developed in Table 2 for the Federal project. Federal participation was based upon public accessibility and parking availability at the public accesses. Federal participation is also based upon the project being open to the public.

124. The delineation of Federal and non-Federal responsibility is legally defined in the Project Cooperation Agreement (PCA). The Federal cost share apportionment rate is 56.40 percent for the Federal project (Table 3) for Segment II. The cost apportionment summary for the Federal

Table 2
Segment II (R-25 to R-71)
Cost Apportionment

PARCEL DESCRIPTIVE NAME	SHORE FRONT LENGTH (FEET)	WITHIN 0.25 MILE OF PUBLIC ACCESS	WITHIN 0.25 MILE OF PUBLIC PARKING	SHORE OWNERSHIP & PROJECT PURPOSE	FEDERAL COST SHARING	LENGTH TIMES COST SHARING
CITY OF POMPANO BEACH						
484329041380'	308	YES	NO	IIA	65%	200
484329041370'	79	YES	NO	IIA	65%	51
484329041360'	89	YES	NO	IIA	65%	58
484329041350'	74	YES	NO	IIA	65%	48
484329041340'	75	YES	NO	IIA	65%	49
484329041190'	20	YES	NO	IIA	65%	13
484329041330'	77	YES	NO	IIA	65%	50
484329041180'	101	YES	NO	IIA	65%	66
484329041320'	87	YES	NO	IIA	65%	57
484329041310'	92	YES	NO	IIA	65%	60
484329041300'	90	YES	NO	IIA	65%	59
484329041290'	78	YES	NO	IIA	65%	51
484329041280'	76	YES	YES	IIA	65%	49
484329041270'	76	YES	YES	IIA	65%	49
484329041260'	78	YES	YES	IIA	65%	51
484329041250'	81	YES	YES	IIA	65%	53
484329041240'	75	YES	YES	IIA	65%	49
484329041230'	71	YES	YES	IIA	65%	46
484329041220'	140	YES	YES	IIA	65%	91
484329041200'	65	YES	YES	IIA	65%	42
BEACH ACCESS	50	YES	YES	IIA	65%	33
484329030060'	100	YES	YES	IIA	65%	65
484329BG'	100	YES	YES	IIA	65%	65
484329AD'	200	YES	YES	IIA	65%	130
484329AC'	156	YES	YES	IIA	65%	101
NE 16TH ST	40	YES	YES	IIA	65%	26
484329010060'	100	YES	YES	IIA	65%	65
484329BD'	207	YES	YES	IIA	65%	135
484329CC'	85	YES	YES	IIA	65%	55
484329BC'	117	YES	YES	IIA	65%	76
484329CB'	170	YES	YES	IIA	65%	111
484329BJ'	103	YES	YES	IIA	65%	67
484330NU'	204	YES	YES	IIA	65%	133
NE 13TH ST	50	YES	YES	IIA	65%	33
484330019999'	120	YES	YES	IIA	65%	78
484330011400'	155	YES	YES	IIA	65%	101
484330011390'	100	YES	YES	IIA	65%	65
484330011160'	140	YES	YES	IIA	65%	91
484330AB'	360	YES	YES	IIA	65%	234
484330BA'	50	YES	YES	IIA	65%	33
NE 11TH ST	30	YES	YES	IIA	65%	20

OWNERSHIP	PROJECT PURPOSE	FEDERAL PARTICIPATION
I. FEDERALLY OWNED	A. Hurricane and Storm Damage Reduction	100
	B. Land Loss	100
	C. Recreation (Seperable)	100
II. PUBLIC & PRIVATELY OWNED (YIELDING PUBLIC BENEFITS)	A. Hurricane and Storm Damage Reduction	65
	B. Land Loss	50
	C. Recreation (Seperable)	50
III. PRIVATELY OWNED	A. Hurricane and Storm Damage Reduction	0
	B. Land Loss	0
	C. Recreation (Seperable)	0

NOTES:
1. SHORE FRONTAGE LENGTH IS THE LENGTH OF THE ENTIRE PARCEL.
2. THE SHORE FRONTAGE LENGTH IS DETERMINED FROM THE TAX APPRAISER'S MAPS.
3. ALL PARCELS ARE LOCATED WITHIN THE PROJECT LIMITS.

Table 2 (Continued)
Segment II (R-25 to R-71)
Cost Apportionment

PARCEL DESCRIPTIVE NAME	SHORE FRONT LENGTH (FEET)	WITHIN 0.25 MILE OF PUBLIC ACCESS	WITHIN 0.25 MILE OF PUBLIC PARKING	SHORE OWNERSHIP & PROJECT PURPOSE	FEDERAL COST SHARING	LENGTH TIMES COST SHARING
CITY OF POMPANO BEACH						
484331CD'	250	YES	YES	IIA	65%	163
484331BH'	103	YES	NO	IIA	65%	67
484331DK'	100	YES	NO	IIA	65%	65
484331BA'	360	YES	NO	IIA	65%	234
484331109999'	100	YES	NO	IIA	65%	65
484331100090'	107	YES	NO	IIA	65%	70
484331100100'	208	YES	NO	IIA	65%	135
484331090010'	50	YES	NO	IIA	65%	33
484331090020'	99	YES	NO	IIA	65%	64
484331090030'	57	YES	NO	IIA	65%	37
484331GA'	201	YES	NO	IIA	65%	131
484331DH'	100	YES	NO	IIA	65%	65
484331110030'	100	YES	NO	IIA	65%	65
484331DG'	200	YES	NO	IIA	65%	130
484331GB'	357	YES	NO	IIA	65%	232
484331080030'	75	YES	YES	IIA	65%	49
484331080020'	120	YES	YES	IIB	50%	60
484331080010'	50	YES	YES	IIB	50%	25
484331010010'	1200	YES	YES	IIB	50%	600
484331010190'	384	YES	YES	IIB	50%	192
484331010320'	515	YES	YES	IIB	50%	258
484331010300'	510	YES	YES	IIB	50%	255
494306060070'	200	YES	YES	IIA	65%	130
494306NR'	155	YES	YES	IIA	65%	101
494306060090'	368	YES	YES	IIA	65%	239
SE 2ND ST	50	YES	YES	IIA	65%	33
494306060120'	100	YES	YES	IIA	65%	65
494306DD'	97	YES	YES	IIA	65%	63
494306060150'	64	YES	YES	IIA	65%	42
494306060160'	45	YES	YES	IIA	65%	29
494306060170'	100	YES	YES	IIA	65%	65
494306060180'	60	YES	YES	IIA	65%	39
SE 4TH ST	50	YES	YES	IIA	65%	33
494306060190'	67	YES	YES	IIA	65%	44
494306060200'	51	YES	YES	IIA	65%	33
494306060210'	43	YES	YES	IIA	65%	28
494306060220'	59	YES	YES	IIA	65%	38
494306060290'	94	YES	YES	IIA	65%	61
494306DJ'	159	YES	YES	IIA	65%	103
SE 6TH ST	50	YES	YES	IIA	65%	33

OWNERSHIP	PROJECT PURPOSE	FEDERAL PARTICIPATION
I. FEDERALLY OWNED	A. Hurricane and Storm Damage Reduction	100
	B. Land Loss	100
	C. Recreation (Seperable)	100
II. PUBLIC & PRIVATELY OWNED (YIELDING PUBLIC BENEFITS)	A. Hurricane and Storm Damage Reduction	65
	B. Land Loss	50
	C. Recreation (Seperable)	50
III. PRIVATELY OWNED	A. Hurricane and Storm Damage Reduction	0
	B. Land Loss	0
	C. Recreation (Seperable)	0

NOTES:
1. SHORE FRONTAGE LENGTH IS THE LENGTH OF THE ENTIRE PARCEL.
2. THE SHORE FRONTAGE LENGTH IS DETERMINED FROM THE TAX APPRAISER'S MAPS.
3. ALL PARCELS ARE LOCATED WITHIN THE PROJECT LIMITS.

Table 2 (Continued)
Segment II (R-25 to R-71)
Cost Apportionment

PARCEL DESCRIPTIVE NAME	SHORE FRONT LENGTH (FEET)	WITHIN 0.25 MILE OF PUBLIC ACCESS	WITHIN 0.25 MILE OF PUBLIC PARKING	SHORE OWNERSHIP & PROJECT PURPOSE	FEDERAL COST SHARING	LENGTH TIMES COST SHARING
CITY OF POMPANO BEACH						
494306DB'	153	YES	YES	IIA	65%	99
494306030020'	50	YES	YES	IIA	65%	33
494306CM'	55	YES	YES	IIA	65%	36
494306030040'	51	YES	YES	IIA	65%	33
SE 8TH ST	50	YES	YES	IIA	65%	33
494306030050'	59	YES	YES	IIA	65%	38
494306030060'	53	YES	YES	IIA	65%	34
494306GC'	190	YES	YES	IIA	65%	124
494306CB'	197	YES	YES	IIA	65%	128
494306DH'	180	YES	YES	IIA	65%	117
494306PY'	335	YES	YES	IIA	65%	218
494305010080'	220	YES	YES	IIA	65%	143
SE 12TH ST.	40	YES	YES	IIA	65%	26
494305AA'	78	YES	YES	IIA	65%	51
494305000020'	156	YES	YES	IIA	65%	101
494305000030'	153	YES	YES	IIA	65%	99
494306GA'	181	YES	YES	IIA	65%	118
494305AB'	300	YES	YES	IIA	65%	195
494305000071'	204	YES	YES	IIA	65%	133
494305AC'	283	YES	YES	IIA	65%	184
494306000320'	251	NO	NO	IIIA	0%	0
494306AF'	295	NO	NO	IIIA	0%	0
494306PT'	160	NO	NO	IIIA	0%	0
PRIVATE ACCESS	105	NO	NO	IIIA	0%	0
494306PU'	151	NO	NO	IIIA	0%	0
494306PV'	198	NO	NO	IIIA	0%	0
494306PW'	207	NO	NO	IIIA	0%	0
494306000380'	105	NO	NO	IIIA	0%	0
494306PX'	310	NO	NO	IIIA	0%	0
494306HD'	180	NO	NO	IIIA	0%	0
494306000410'	199	YES	NO	IIA	65%	129
494306NP'	197	YES	NO	IIA	65%	128
494306CA'	102	YES	NO	IIA	65%	66
494307AG'	185	YES	NO	IIA	65%	120
494307NN'	209	YES	NO	IIA	65%	136
494307000040'	197	YES	NO	IIA	65%	128
494307AK'	306	YES	NO	IIA	65%	199
BEACH ACCESS	10	YES	NO	IIA	65%	7
49430717	305	YES	NO	IIA	65%	198
494307AC'	157	YES	NO	IIA	65%	102
494307BG'	107	YES	NO	IIA	65%	70

OWNERSHIP	PROJECT PURPOSE	FEDERAL PARTICIPATION
I. FEDERALLY OWNED	A. Hurricane and Storm Damage Reduction	100
	B. Land Loss	100
	C. Recreation (Seperable)	100
II. PUBLIC & PRIVATELY OWNED (YIELDING PUBLIC BENEFITS)	A. Hurricane and Storm Damage Reduction	65
	B. Land Loss	50
	C. Recreation (Seperable)	50
III. PRIVATELY OWNED	A. Hurricane and Storm Damage Reduction	0
	B. Land Loss	0
	C. Recreation (Seperable)	0

NOTES:
1. SHORE FRONTAGE LENGTH IS THE LENGTH OF THE ENTIRE PARCEL.
2. THE SHORE FRONTAGE LENGTH IS DETERMINED FROM THE TAX APPRAISER'S MAPS.
3. ALL PARCELS ARE LOCATED WITHIN THE PROJECT LIMITS.

Table 2 (Continued)
Segment II (R-25 to R-71)
Cost Apportionment

PARCEL DESCRIPTIVE NAME	SHORE FRONT LENGTH (FEET)	WITHIN 0.25 MILE OF PUBLIC ACCESS	WITHIN 0.25 MILE OF PUBLIC PARKING	SHORE OWNERSHIP & PROJECT PURPOSE	FEDERAL COST SHARING	LENGTH TIMES COST SHARING
CITY OF POMPANO BEACH						
494307BK'	343	YES	NO	IIA	65%	223
494307NP'	204	YES	NO	IIA	65%	133
494307NP'	250	YES	NO	IIA	65%	163
494307000123'	149	YES	NO	IIA	65%	97
494307AH'	300	YES	NO	IIA	65%	195
BEACH ACCESS	20	YES	NO	IIA	65%	13
494307000320'	413	YES	NO	IIA	65%	268
SEA RANCH LAKES						
494307AF'	192	YES	NO	IIA	65%	125
494307AA'	315	YES	NO	IIA	65%	205
494307AB'	299	YES	NO	IIA	65%	194
49430710'	220	YES	NO	IIA	65%	143
494307AL'	252	NO	NO	IIIA	0%	0
494307BH'	474	NO	NO	IIIA	0%	0
494307BJ'	318	NO	NO	IIIA	0%	0
494307CA'	477	YES	YES	IIA	65%	310
LAUDERDALE BY THE SEA						
494318010610'	250	YES	YES	IIA	65%	163
494318010590'	51	YES	YES	IIA	65%	33
494318BA'	101	YES	YES	IIA	65%	66
494318010570'	99	YES	YES	IIA	65%	64
494318010550'	153	YES	YES	IIA	65%	99
494318010540'	70	YES	YES	IIA	65%	46
494318010530'	85	YES	YES	IIA	65%	55
WASHINGTONIA ST	50	YES	YES	IIA	65%	33
494318GB'	52	YES	YES	IIA	65%	34
494318010510'	106	YES	YES	IIA	65%	69
494318010500'	66	YES	YES	IIA	65%	43
494318010490'	76	YES	YES	IIA	65%	49
494318010470'	103	YES	YES	IIA	65%	67
494318DK'	250	YES	YES	IIA	65%	163
494318019999'	150	YES	YES	IIA	65%	98
494318010380'	49	YES	YES	IIA	65%	32
494318010370'	99	YES	YES	IIA	65%	64
494318010360'	103	YES	YES	IIA	65%	67
494318010350'	53	YES	YES	IIA	65%	34
494318010340'	48	YES	YES	IIA	65%	31
494318010330'	103	YES	YES	IIA	65%	67
494318GA'	55	YES	YES	IIA	65%	36
494318010310'	48	YES	YES	IIA	65%	31
494318010300'	100	YES	YES	IIA	65%	65
494318010290'	118	YES	YES	IIA	65%	77

OWNERSHIP	PROJECT PURPOSE	FEDERAL PARTICIPATION
I. FEDERALLY OWNED	A. Hurricane and Storm Damage Reduction	100
	B. Land Loss	100
	C. Recreation (Seperable)	100
II. PUBLIC & PRIVATELY OWNED	A. Hurricane and Storm Damage Reduction	65
(YIELDING PUBLIC BENEFITS)	B. Land Loss	50
	C. Recreation (Seperable)	50
III. PRIVATELY OWNED	A. Hurricane and Storm Damage Reduction	0
	B. Land Loss	0
	C. Recreation (Seperable)	0

NOTES:
1. SHORE FRONTAGE LENGTH IS THE LENGTH OF THE ENTIRE PARCEL.
2. THE SHORE FRONTAGE LENGTH IS DETERMINED FROM THE TAX APPRAISER'S MAPS.
3. ALL PARCELS ARE LOCATED WITHIN THE PROJECT LIMITS.

Table 2 (Continued)
Segment II (R-25 to R-71)
Cost Apportionment

PARCEL DESCRIPTIVE NAME	SHORE FRONT LENGTH (FEET)	WITHIN 0.25 MILE OF PUBLIC ACCESS	WITHIN 0.25 MILE OF PUBLIC PARKING	SHORE OWNERSHIP & PROJECT PURPOSE	FEDERAL COST SHARING	LENGTH TIMES COST SHARING
LAUDERDALE BY THE SEA						
COMMERCIAL BLD.	100	YES	YES	IIA	65%	65
494318010240'	100	YES	YES	IIA	65%	65
494318010230'	97	YES	YES	IIA	65%	63
494318010220'	203	YES	YES	IIA	65%	132
494318010200'	98	YES	YES	IIA	65%	64
494318010190'	56	YES	YES	IIA	65%	36
494318010180'	42	YES	YES	IIA	65%	27
494318NP'	102	YES	YES	IIA	65%	66
DATURA AVE.	50	YES	YES	IIA	65%	33
494318DA'	156	YES	YES	IIA	65%	101
494318DD'	96	YES	YES	IIA	65%	62
494318CH'	296	YES	YES	IIA	65%	192
494318019999'	52	YES	YES	IIA	65%	34
HIBISCUS AVE.	60	YES	YES	IIA	65%	39
494318010070'	49	YES	YES	IIA	65%	32
494318010060'	148	YES	YES	IIA	65%	96
494318010050'	52	YES	YES	IIA	65%	34
494318010040'	40	YES	YES	IIA	65%	26
494318010030'	196	YES	YES	IIA	65%	127
494318010020'	103	YES	YES	IIA	65%	67
PALM AVE.	50	YES	YES	IIA	65%	33
494318NN'	201	YES	YES	IIA	65%	131
CITY OF FORT LAUDERDALE						
494318AB'	339	YES	YES	IIA	65%	220
FLAMINGO AVE	30	YES	YES	IIA	65%	20
494319AE'	435	YES	YES	IIA	65%	283
494319AM'	331	YES	YES	IIA	65%	215
494319CA'	205	YES	NO	IIA	65%	133
494319080030'	206	YES	NO	IIA	65%	134
494319AD'	186	YES	NO	IIA	65%	121
494319080010' (HOTEL)	216	NO	NO	IIIA	0%	0
494319CH'	208	NO	NO	IIIA	0%	0
494319BB'	195	NO	NO	IIIA	0%	0
494319AA'	215	NO	NO	IIIA	0%	0
494319BM'	410	NO	NO	IIIA	0%	0
494319AK'	192	NO	NO	IIIA	0%	0
494319CJ'	205	NO	NO	IIIA	0%	0
494319BA'	202	NO	NO	IIIA	0%	0
494319CC'	200	NO	NO	IIIA	0%	0
494319NP'	201	NO	NO	IIIA	0%	0
494319BC'	201	NO	NO	IIIA	0%	0
494319BJ'	395	YES	NO	IIA	65%	257
494319AB'	200	YES	NO	IIA	65%	130
494319BK'	393	YES	NO	IIA	65%	255
494319DC'	620	YES	NO	IIA	65%	403

OWNERSHIP	PROJECT PURPOSE	FEDERAL PARTICIPATION
I. FEDERALLY OWNED	A. Hurricane and Storm Damage Reduction	100
	B. Land Loss	100
	C. Recreation (Seperable)	100
II. PUBLIC & PRIVATELY OWNED (YIELDING PUBLIC BENEFITS)	A. Hurricane and Storm Damage Reduction	65
	B. Land Loss	50
	C. Recreation (Seperable)	50
III. PRIVATELY OWNED	A. Hurricane and Storm Damage Reduction	0
	B. Land Loss	0
	C. Recreation (Seperable)	0

NOTES:
1. SHORE FRONTAGE LENGTH IS THE LENGTH OF THE ENTIRE PARCEL.
2. THE SHORE FRONTAGE LENGTH IS DETERMINED FROM THE TAX APPRAISER'S MAPS.
3. ALL PARCELS ARE LOCATED WITHIN THE PROJECT LIMITS.

Table 2 (Continued)
Segment II (R-25 to R-71)
Cost Apportionment

PARCEL DESCRIPTIVE NAME	SHORE FRONT LENGTH (FEET)	WITHIN 0.25 MILE OF PUBLIC ACCESS	WITHIN 0.25 MILE OF PUBLIC PARKING	SHORE OWNERSHIP & PROJECT PURPOSE	FEDERAL COST SHARING	LENGTH TIMES COST SHARING
OAKLAND PARK BLVD.	40	YES	NO	IIA	65%	26
494330012750'	54	YES	NO	IIA	65%	35
494330012740'	56	YES	NO	IIA	65%	36
494330012730'	50	YES	YES	IIA	65%	33
494330012720'	90	YES	YES	IIA	65%	59
494330012700'	57	YES	YES	IIA	65%	37
494330012690'	50	YES	YES	IIA	65%	33
494330012680'	50	YES	YES	IIA	65%	33
494330012670'	49	YES	YES	IIA	65%	32
494330012660'	79	YES	YES	IIA	65%	51
494330012650'	74	YES	YES	IIA	65%	48
494330012640'	51	YES	YES	IIA	65%	33
494330012630'	49	YES	YES	IIA	65%	32
494330012620'	52	YES	YES	IIA	65%	34
494330012614'	50	YES	YES	IIA	65%	33
30TH ST	50	YES	YES	IIA	65%	33
CITY OF FORT LAUDERDALE						
494330012840'	100	YES	YES	IIA	65%	65
494330012830'	52	YES	YES	IIA	65%	34
494330012820'	52	YES	YES	IIA	65%	34
494330012810'	44	YES	YES	IIA	65%	29
494330012800'	52	YES	YES	IIA	65%	34
494330012790'	50	YES	YES	IIA	65%	33
494330012780'	50	YES	YES	IIA	65%	33
494330012770'	52	YES	YES	IIA	65%	34
494330012760'	57	YES	YES	IIA	65%	37
VISTA PARK	150	YES	YES	IIA	65%	98
494330012850'	111	YES	YES	IIA	65%	72
494330012860'	97	YES	YES	IIA	65%	63
494330012870'	54	YES	YES	IIA	65%	35
494330012880'	49	YES	YES	IIA	65%	32
494330012890'	51	YES	YES	IIA	65%	33
494330012900'	49	YES	YES	IIA	65%	32
494330012910'	52	YES	YES	IIA	65%	34
494330012920'	56	YES	YES	IIA	65%	36
494330010130'	125	YES	YES	IIA	65%	81

OWNERSHIP	PROJECT PURPOSE	FEDERAL PARTICIPATION
I. FEDERALLY OWNED	A. Hurricane and Storm Damage Reduction	100
	B. Land Loss	100
	C. Recreation (Seperable)	100
II. PUBLIC & PRIVATELY OWNED (YIELDING PUBLIC BENEFITS)	A. Hurricane and Storm Damage Reduction	65
	B. Land Loss	50
	C. Recreation (Seperable)	50
III. PRIVATELY OWNED	A. Hurricane and Storm Damage Reduction	0
	B. Land Loss	0
	C. Recreation (Seperable)	0

NOTES:
1. SHORE FRONTAGE LENGTH IS THE LENGTH OF THE ENTIRE PARCEL.
2. THE SHORE FRONTAGE LENGTH IS DETERMINED FROM THE TAX APPRAISER'S MAPS.
3. ALL PARCELS ARE LOCATED WITHIN THE PROJECT LIMITS.

Table 2 (Continued)
Segment II (R-25 to R-71)
Cost Apportionment

PARCEL DESCRIPTIVE NAME	SHORE FRONT LENGTH (FEET)	WITHIN 0.25 MILE OF PUBLIC ACCESS	WITHIN 0.25 MILE OF PUBLIC PARKING	SHORE OWNERSHIP & PROJECT PURPOSE	FEDERAL COST SHARING	LENGTH TIMES COST SHARING
CITY OF FORT LAUDERDALE						
27TH ST	100	YES	YES	IIA	65%	65
494330010150'	62	YES	YES	IIA	65%	40
494330010140'	63	YES	YES	IIA	65%	41
494330013010'	52	YES	YES	IIA	65%	34
494330013000'	57	YES	YES	IIA	65%	37
494330012980'	99	YES	YES	IIA	65%	64
494330012970'	50	YES	YES	IIA	65%	33
494330012960'	48	YES	YES	IIA	65%	31
494330012950'	58	YES	YES	IIA	65%	38
494330012940'	49	YES	YES	IIA	65%	32
494330012930'	42	YES	YES	IIA	65%	27
25TH ST	40	YES	YES	IIA	65%	26
494330013100'	79	YES	YES	IIA	65%	51
494330013080'	100	YES	YES	IIA	65%	65
494330013070'	50	YES	YES	IIA	65%	33
494330013060'	50	YES	YES	IIA	65%	33
494330013050'	25	YES	YES	IIIB	0%	0
494330013042'	25	YES	YES	IIIB	0%	0
494330013040'	55	YES	YES	IIA	65%	36
494330013030'	50	YES	YES	IIA	65%	33
494330013020'	95	YES	YES	IIA	65%	62
23RD ST	40	YES	YES	IIA	65%	26
494330013140'	205	YES	YES	IIA	65%	133
494930013130'	50	YES	YES	IIA	65%	33
494330013120'	102	YES	YES	IIA	65%	66
494330013110'	100	YES	YES	IIA	65%	65
22ND ST	40	YES	YES	IIA	65%	26
494330013180'	450	YES	YES	IIA	65%	293
21ST ST	40	YES	YES	IIA	65%	26
494330013370'	100	YES	YES	IIA	65%	65
494330013360'	50	YES	YES	IIA	65%	33
494330013350'	50	YES	YES	IIA	65%	33
494330013340'	50	YES	YES	IIA	65%	33
494330013330'	50	YES	YES	IIA	65%	33
494330013320'	50	YES	YES	IIA	65%	33
494330013310'	50	YES	YES	IIA	65%	33
494330013300'	50	YES	YES	IIA	65%	33
494330013290'	50	YES	YES	IIA	65%	33
494330013280'	100	YES	YES	IIA	65%	65
494330BB'	149	YES	YES	IIA	65%	97
494330CC'	78	YES	YES	IIA	65%	51
FT LAUD. PUBLIC BEACH	7890	YES	YES	IIA	65%	5129

TOTAL LENGTH (FT) 46444 FEDERAL PARTICIPATION (FT) 26196

FEDERAL PARTICIPATION PERCENTAGE RATE 56.40%

OWNERSHIP	PROJECT PURPOSE	FEDERAL PARTICIPATION
I. FEDERALLY OWNED	A. Hurricane and Storm Damage Reduction	100
	B. Land Loss	100
	C. Recreation (Seperable)	100
II. PUBLIC & PRIVATELY OWNED (YIELDING PUBLIC BENEFITS)	A. Hurricane and Storm Damage Reduction	65
	B. Land Loss	50
	C. Recreation (Seperable)	50
III. PRIVATELY OWNED	A. Hurricane and Storm Damage Reduction	0
	B. Land Loss	0
	C. Recreation (Seperable)	0

NOTES:
1. SHORE FRONTAGE LENGTH IS THE LENGTH OF THE ENTIRE PARCEL.
2. THE SHORE FRONTAGE LENGTH IS DETERMINED FROM THE TAX APPRAISER'S MAPS.
3. ALL PARCELS ARE LOCATED WITHIN THE PROJECT LIMITS.

Table 3: Segment II Cost Sharing Summary

COST APPORTIONMENT SUMMARY FEDERAL PROJECT (POMPANO BEACH/LAUDERDALE-BY-THE-SEA/FT LAUDERDALE) FOR RENOURISHMENT NO.2				
ITEM	TOTAL COST(1) ($1,000)	FEDERAL SHARE (%)	FEDERAL COST ($1,000)	NONFEDERAL COST ($1,000)
DREDGE MOB/DEMOBILIZATION	1,100	56.40%	620	480
BEACH FILL	8,316	56.40%	4,690	3,626
HARDBOTTOM MITIGATION	1,800	56.40%	1,015	785
BEACH TILLING	29	0.00%	0	29
SUB TOTAL	11,245			
CONTINGENCY (15%)	1,687	56.40%	951	735
CONSTRUCTION TOTAL	12,931			
GEOTECHNICAL INVESTIGATIONS	190	56.40%	107	83
LAND EASEMENTS, ETC.	250	0.00%	0	250
ENVIRONMENTAL MONITORING	275	56.40%	155	120
E&D & S&A	1,342	56.40%	757	585
PROJECT TOTAL	14,988		8,296	6,692
PROJECT PERCENTAGES			55.35%	44.65%

NOTE:
(1) COSTS FROM TABLE A-27 IN APPENDIX A.

project area is estimated in Table 3. The Federal share for the Federal project is $8,296,000. The Federal participation percentage rate of 55.35 percent, for the Federal project, is 8.3 percent less than the percentage rate presented in the April 1994 Reevaluation Report Section 934 Study for Broward County. The reduction in the percentage rate is due to the reclassification of 1,800 feet of privately owned shoreline that is located outside of the 0.25 mile limits of public access and public parking and two vacant lots.

Segment III

125. A property by property determination of Federal participation for Segment III was developed in Table 4. The delineation of Federal and non-Federal responsibility is legally defined in the Project Cooperation Agreement (PCA). In accordance with all of the current shoreline ownership and land usage, existing law, and cost apportionment policies for Federal participation in shore protection projects, it was determined that the Federal cost apportionment rate for the Segment III project is 56.16 percent and the non-Federal rate is 43.84 percent.

126. The total cost of the 2002 project construction is $24,218,000. Table 5 presents the Federal share of each project feature of the 2002 construction. The Federal share of the 2002 Segment III project is $13,335,000. The total non-Federal responsibility of the 2002 Segment III project is $10,883,000.

127. Future sand bypassing at Port Everglades would be an alternate source of sand for the Segment III shore protection project. Therefore, it will be a project feature that would benefit the entire Segment III reach and thus will be cost-shared according to the ownership and usage of Segment III. Table 6 presents the Federal share of the construction and operation of the bypassing facility based upon the Segment III cost-sharing percentage and current information regarding the facility Segment III. It is noted that the estimated costs are preliminary and based upon the available information for a sand bypassing facility at Port Everglades. A Design Documentation Report (DDR) will be prepared to further evalute the infrastructure required to implement the bypassing facility and operational guidelines. The ultimate Federal share will be refined in the DDR and will be based upon the ownership and useage of the Segment III shoreline at the time the facility is operational. It is anticiapted that the facility will be operational by 2008 – the time of the next renourishment for Segment III.

Table 4: Authorized Federal Project (Segment III) Cost Apportionment.

PARCEL DESCRIPTIVE NAME	SHORE FRONT LENGTH (FEET)	WITHIN 0.25 MILE OF PUBLIC ACCESS	WITHIN 0.25 MILE OF PUBLIC PARKING	SHORE OWNERSHIP & PROJECT PURPOSE	FEDERAL COST SHARING (PERCENT)	LENGTH TIMES COST SHARING (FEET)
John U. Lloyd Beach State Recreation Area						
Naval Surface Warfare Center	350	YES	YES	I-A	100%	350
Park (John U. Lloyd)	7,800	YES	YES	II-C	50%	3,900
Hollywood						
Street End	40	YES	YES	II-A	65%	26
Vacant Lot	85	YES	YES	III-B	0%	0
514201027480 (MF)	85	YES	YES	II-A	65%	55
Street End	40	YES	YES	II-A	65%	26
Vacant Lot	80	YES	YES	III-B	0%	0
Vacant Lot	80	YES	YES	III-B	0%	0
Vacant Lot	250	YES	YES	III-B	0%	0
Vacant Lot	80	YES	YES	III-B	0%	0
51420102670 (HOTEL)	80	YES	YES	II-A	65%	52
Vacant Lot	120	YES	YES	III-B	0%	0
514201026660 (SF)	80	YES	YES	II-A	65%	52
Street End	40	YES	YES	II-A	65%	26
514201AA (CONDO)	85	YES	YES	II-A	65%	55
51401026440 (SF)	35	YES	YES	II-A	65%	23
51401026430 (SF)	40	YES	YES	II-A	65%	26
Street End	30	YES	YES	II-A	65%	20
Park	4,000	YES	YES	II-C	50%	2,000
Street End	40	YES	YES	II-A	65%	26
Park	1,420	YES	YES	II-C	50%	710
Boardwalk/Commercial (**)	9,675	YES	YES	II-A	65%	6,289
Park	1,075	YES	YES	II-C	50%	538
Street End	40	YES	YES	II-A	65%	26
514224CR (CONDO)	160	YES	YES	II-A	65%	104
Beach Access	40	YES	YES	II-C	50%	20
514224NP (COOP)	160	YES	YES	II-A	65%	104
Beach Access	40	YES	YES	II-C	50%	20
514224CA (CONDO)	80	YES	YES	II-A	65%	52
514224020190 (MF)	80	YES	YES	II-A	65%	52
Beach Access	40	YES	YES	II-C	50%	20
514224020230 (CONDO)	160	YES	YES	II-A	65%	104
Beach Access	40	YES	YES	II-C	50%	20
514224NR (COOP)	160	YES	YES	II-A	65%	104
Beach Access	40	YES	YES	II-C	50%	20
514224020360 (MF)	80	YES	YES	II-A	65%	52
514224020350 (MF)	80	YES	YES	II-A	65%	52
Beach Access	40	YES	YES	II-C	50%	20

OWNERSHIP	PROJECT PURPOSE	FEDERAL PARTICIPATION
I. FEDERALLY OWNED	A. Hurricane and Storm Damage Reduction	100
	B. Land Loss	100
	C. Recreation (Seperable)	100
II. PUBLIC & PRIVATELY OWNED		
(YIELDING PUBLIC BENEFITS)	A. Hurricane and Storm Damage Reduction	65
	B. Land Loss	50
	C. Recreation (Seperable)	50
III. PRIVATELY OWNED		
	A. Hurricane and Storm Damage Reduction	0
	B. Land Loss	0
	C. Recreation (Seperable)	0

NOTES:
1. SHORE FRONTAGE LENGTH IS THE LENGTH OF THE ENTIRE PARCEL.
2. THE SHORE FRONTAGE LENGTH IS DETERMINED FROM THE TAX APPRAISER'S MAPS.
3. ALL PARCELS ARE LOCATED WITHIN THE PROJECT LIMITS.

(**) The boardwalk is 45-feet wide and fronts a highly developed commerical distrcit along central

Table 4: Authorized Federal Project (Segment III) Cost Apportionment (cont'd).

PARCEL DESCRIPTIVE NAME	SHORE FRONT LENGTH (FEET)	WITHIN 0.25 MILE OF PUBLIC ACCESS	WITHIN 0.25 MILE OF PUBLIC PARKING	SHORE OWNERSHIP & PROJECT PURPOSE	FEDERAL COST SHARING (PERCENT)	LENGTH TIMES COST SHARING (FEET)
514224BG (CONDO)	160	YES	YES	II-A	65%	104
Beach Access	40	YES	YES	II-C	50%	20
514224020460 (MF)	80	YES	YES	II-A	65%	52
514224020450 (MF)	80	YES	YES	II-A	65%	52
Beach Access	40	YES	YES	II-C	50%	20
514224029999 (CONDO)	80	YES	YES	II-A	65%	52
514224BH (CONDO)	400	YES	YES	II-A	65%	260
514224020640 Park	90	YES	YES	II-A	65%	59
Beach Access	45	YES	YES	II-C	50%	23
514224010400 (CONDO)	360	YES	YES	II-A	65%	234
514224010401 (HOTEL)	245	YES	YES	II-A	65%	159
514224BB (CONDO)	250	YES	YES	II-A	65%	163
514224010420 (CONDO)	355	YES	YES	II-A	65%	231
514224010430 (CONDO)	240	YES	YES	II-A	65%	156
514224010450 (CONDO)	280	YES	YES	II-A	65%	182
514224010480 (CONDO)	895	YES	YES	II-A	65%	582
Beach Access	20	YES	YES	II-C	50%	10
514226010010 (CONDO)	210	YES	YES	II-A	65%	137
514226000020 (MF)	385	YES	YES	II-A	65%	250
514226000030 (MF)	360	YES	YES	II-A	65%	234
514226010130 (CONDO)	150	YES	YES	II-A	65%	98
Park	180	YES	YES	II-C	50%	90
HALLANDALE BEACH						
Park	320	YES	YES	II-C	50%	160
Vacant Lot	780	YES	YES	III-B	0	0
Park	300	YES	YES	II-C	50%	150
514226CB (CONDO)	170	YES	YES	II-A	65%	111
514226BC (CONDO)	220	YES	YES	II-A	65%	143
514226CJ (CONDO)	190	YES	YES	II-A	65%	124
514226HB (CONDO)	115	YES	YES	II-A	65%	75
514226NV (CONDO)	155	YES	YES	II-A	65%	101
514226BH (CONDO)	650	YES	YES	II-A	65%	423
Beach Access	20	YES	YES	II-C	50%	10
514226GH (CONDO)	110	YES	YES	II-A	65%	72
514226BE (CONDO)	300	YES	YES	II-A	65%	195
514226020220 (HOTEL)	110	YES	YES	II-A	65%	72
514226020350 (HOTEL)	175	YES	YES	II-A	65%	114
514226NW (COOP)	130	YES	YES	II-A	65%	85
Beach Access	20	YES	YES	II-C	50%	10
514226DC (CONDO)	170	YES	YES	II-A	65%	111
514226DA (CONDO)	350	YES	YES	II-A	65%	228

TOTAL SHORELINE (FT) 36,080 FEDERAL PARTICIPATION (FT) 20,262

FEDERAL PARTICIPATION PERCENTAGE RATE 56.16%

OWNERSHIP	PROJECT PURPOSE	FEDERAL PARTICIPATION
I. FEDERALLY OWNED	A. Hurricane and Storm Damage Reduction	100
	B. Land Loss	100
	C. Recreation (Seperable)	100
II. PUBLIC & PRIVATELY OWNED		
(YIELDING PUBLIC BENEFITS)	A. Hurricane and Storm Damage Reduction	65
	B. Land Loss	50
	C. Recreation (Seperable)	50
III. PRIVATELY OWNED		
	A. Hurricane and Storm Damage Reduction	0
	B. Land Loss	0
	C. Recreation (Seperable)	0

NOTES:
1. SHORE FRONTAGE LENGTH IS THE LENGTH OF THE ENTIRE PARCEL.
2. THE SHORE FRONTAGE LENGTH IS DETERMINED FROM THE TAX APPRAISER'S MAPS.
3. ALL PARCELS ARE LOCATED WITHIN THE PROJECT LIMITS.

Table 5: Segment III cost apportionment summary for renourishment No. 2.

ITEM	TOTAL COST ($1000)	FEDERAL SHARE	FEDERAL COST ($1000)	NONFEDERAL COST ($1000)
DREDGE MOB/DEMOBILIZATION	1,000	56.16%	562	438
BEACH FILL	15,077	56.16%	8,467	6,610
BEACH TILLING	35	0.00%	0	35
HARDBOTTOM MITIGATION	2,268	56.16%	1,274	994
GROINS	728	56.16%	409	319
SUB TOTAL	19,107		10,711	8,396
CONTINGENCY (15%)	2,866	56.16%	1,609	1,257
CONSTRUCTION TOTAL	21,973		12,320	9,653
GEOTECHNICAL INVESTIGATIONS	190	56.16%	107	83
LAND EASEMENTS, ETC.	438	0.00%	0	438
ENVIRONMENTAL MONITORING	275	56.16%	154	121
E&D & S&A	1,342	56.16%	754	588
PROJECT TOTAL	24,218		13,335	10,883

Table 6: Segment III cost apportionment summary for future sand bypassing at Port Everglades.

ITEM	TOTAL COST ($1000)	FEDERAL SHARE	FEDERAL COST ($1000)	NONFEDERAL COST ($1000)
BYPASS FACILITY (YEAR 6 - 2008)	7,000	56.16%	3,931	3,069
OPERATION (44,000 CY/YR FOR 6 YEARS AT $3.50 PER YARD)	924	56.16%	519	405
TOTAL	7,924		4,450	3,474

FEDERAL RESPONSIBILITY

128. The U. S. Army Corps of Engineers is responsible for budgeting for the Federal share of construction costs for all future work and reimbursing the Federal share to Broward County upon completion of construction of each segment. Federal funding is subject to budgetary constraints inherent in the formation of the national civil works budget for a given fiscal year. The USACE would review the necessary pre-construction engineering and design needed prior to construction. Reimbursement may be accomplished for each Segment individually as they are separable projects. An audit will be completed following completion of the project.

NON-FEDERAL RESPONSIBILITY

129. The non-Federal project sponsor will construct the project. The non-Federal sponsor will provide the entire cost of all material placed on undeveloped lands and developed private lands (which are inaccessible to the public). The costs for lands, easements, and rights-of-way and a portion of the administrative costs associated with land requirements would also be a non-Federal responsibility.

OTHER NON-FEDERAL REQUIREMENTS

130. Other general non-Federal responsibilities, such as continuing public use of the project beach for which benefits are claimed in the economic justification of the project, and controlling water pollution to safeguard the health of bathers, must also be assumed by the non-Federal sponsor before the project can be constructed. The delineation of Federal and non-Federal responsibility will be legally defined in the project cooperation agreement.

131. The non-Federal project sponsor will be responsible for all costs of operation, maintenance, and rehabilitation, repair, and replacement of project features. Assignment of such responsibility has been included as a part of the items of local cooperation for the project. Details are provided in ER1110-2-2902.

132. Section 402 of the 1986 Water Resources Development Act (33 USC 701 b-1 2) as amended by Section 14 of the 1988 Water Resources Development Act states that "Before construction of any project for local flood protection or any project for hurricane or storm damage reduction, the non-Federal interests shall agree to participate in and comply with applicable Federal flood plain management and flood insurance programs." The non-Federal sponsor and communities must be enrolled in and in compliance with the national Flood Insurance Program (FIP) to receive Federal funding for a recommended storm damage reduction project. Compliance with Section 402 has been added as an item of local cooperation.

PROJECT COOPERATION AGREEMENT

133. The model Project Cooperation Agreement (PCA) and possible deviations based on the recommended plan have been discussed with Broward County. The non-Federal sponsor has a clear understanding of the type of agreement that they will be expected to sign prior to the start of construction.

134. No Federal commitments relating to a construction schedule or specific provisions of the PCA can be made to the non-Federal sponsor on any aspect of this project or separable element until:

(1) The selected plan is authorized by the U.S. Congress;

(2) Construction funds are added by Congress, apportioned by the Office of Management and Budget, and their allocation is approved by the Assistant Secretary of the Army for Civil Works (ASA(CW)); and

(3) The draft PCA has been reviewed and approved by the office of the ASA (CW).

Item (1), above, has been completed.

135. Execution. The PCA will not be executed nor will construction be initiated on this project until the National Environmental Policy Act, the Clean Water Act, the Coastal Zone Management Act, the Endangered Species Act, the Fish and Wildlife Coordination Act, and the National Historic Preservation Act planning phase requirements are met. In the case of the Broward County project, these requirements are met once the Environmental Impact Statement (EIS) has been coordinated, comments prepared, and finalized.

136. Final PCA negotiations with the non-Federal project sponsor may be conducted, and the draft PCA package submitted through the USACE higher authority for review and approval by the ASA (CW), once the GRR is approved. The PCA for construction of this project will be executed only after the GRR is approved.

DEPARTURES FROM THE AUTHORIZED PROJECT

SEGMENT II

137. Project Length. The project length for the 1981 General Design Memorandum (GDM) was 5.3 miles. The project length for the 2002 GRR is 8.8 miles. R-25 was not included in the 1981 GDM project limits (Table 7). Based on the current shoreline conditions of the existing Federal project, it has been determined that 1.5 miles of the 5.4 mile project area (R25-R53) will require nourishment. The areas to be renourished are between FDEP monuments R-37 and R-43 and between FDEP monuments R-51 and R-53. The remaining proposed length extends from R53 to R71 in Ft. Lauderdale.

138. Design Cross-Section. The design berm elevation for the 2002 GRR is +9.0 feet NGVD (Table 7). This berm elevation is identical to the elevation approved in the 1981 GDM. The implemented plan design MHW width is optimized to be 100 feet, referenced from the ECL. The 1981 GDM provides for an average 45-ft extension of the MHW, referenced from the existing 1981 shoreline; however, there is no description of the average MHW distance as referenced from the ECL. Therefore, the 1981 GDM design MHW was determined by scaling the 1981 design MHW location on a map that shows the ECL, determining the distance between the ECL and the 1981 design MHW, and taking the average distance over the entire 5.3 mile 1981 project area. The average 1981 GDM average design MHW width is estimated to be 147 feet from the ECL (Table 7). A width of 20 feet is proposed for Ft. Lauderdale.

139. Volume of Nourishment. The design volume required to reestablish the design MHW width of 100 feet in Pompano/LBTS is 26,000 cubic yards. An additional 476,000 cubic yards is required to construct the Ft. Lauderdale design section. Due to increased bypassing of Hillsboro Inlet, a shortened nourishment length needs to be constructed than in 1983.

140. Volume of Periodic Nourishment. The amount of periodic (advanced) nourishment that will be placed under the implemented plan is less than the volume of fill provided in the 1981 GDM (Table 7). Under the implemented plan, an estimated 71,300 cy/yr of periodic nourishment will be placed within the project area. This is approximately 48,500 cy/yr less than what was included in the 1981 GDM. The estimated periodic nourishment rate is based on actual erosion trends identified within the project area (Appendix A).

141. Renourishment Interval. The NED renourishment interval (6 years) was developed by determining the advanced nourishment life for the maximum volume of sand that minimizes impacts to nearshore resources. This is an increase of 1 year from the 5-year renourishment interval presented in the 1981 GDM.

142. Project Costs. Annual project costs for the proposed NED project are expected to be $4,155,000 (Table 7). This includes the cost of fill placement, hardbottom mitigation, environmental monitoring, beach tilling, geotechnical investigations, the cost of securing easements, a 15 percent contingency, and engineering, design, supervision and contract administration. Annual costs and benefits were estimated using an interest rate of 6 and 1/8 percent. All costs are based on estimated 1999 price levels. The annual cost is $2,743,000 more

Table 7
Segment II
Comparison of the Federal Project(R25-R71) Second Nourishment
With the 1981 GDM

ITEM	1981 GDM SELECTED PLAN	2002 GRR NED PLAN	DEPARTURE FROM 1981 GDM
PROJECT LENGTH (MILES)	5.3	8.8	3.5
EFFECTIVE RENOURISHMENT LENGTH (MILES)	5.3	4.8	-0.5
BERM ELEVATION (NGVD)	9	9	0
DESIGN MHW WIDTH (FT) (1)	147	100/20	-47/20
DESIGN VOLUME (CY) (2)	1,151,000	502,000	-649,000
PERIODIC NOURISHMENT VOL (CY/YR) (5)	119,800	71,300	-48,500
RENOURISHMENT INTERVAL (YR)	5	6	1
INTEREST RATE (%)	7.375	6.125	-1.250
ANNUAL BENEFITS ($) (3)	2,247,000	34,654,000	32,407,000
ANNUAL COST ($) (4)	1,412,000	4,155,000	2,743,000
NET BENEFITS ($) (3)	849,000	30,499,000	29,650,000
BENEFITS TO COST RATIO (3)	1.6	8.3	7
FEDERAL COST (%)	50.00	56.40	6
NON-FEDERAL COST (%)	50.00	43.60	-6
INITIAL COST ($) (5)	9,704,000	14,988,000	5,284,000

1. THE MHW WIDTH IS REFERENCED FROM THE ECL.
2. FROM PARAGRAPHS A-111 AND A-112.
3. FROM TABLE C-17.
4. FROM TABLE A-27.
5. FROM TABLE A-28.

than the annual project costs estimated in the 1981 GDM, but the project is 66 percent longer in length.

143. Project Benefits. Project benefits have been calculated for storm damage prevention, loss of land prevention, and recreational enhancement using current policies and guidelines. The total annual benefits are $34,654,000. This is an increase of $32,407,000 over the benefits provided in the 1981 GDM (Table 7). The net annual benefits are $32,426,000, which is $31,577,000 more than the benefits provided by the 1981 GDM. The benefit to cost ratio for the NED project is 8.3 to 1.0. This is 5.2 times higher than the benefit to cost ratio provided by the 1981 GDM because of increased real estate values.

144. Federal Cost Share. The Federal cost share of eligible costs for the proposed second renourishment of the project is expected to be 56.40 percent. The proposed renourishment Federal cost share is 6.4 percent higher than the Federal cost share in the 1981 GDM.

SEGMENT III

145. The previous Segment III projects have been evaluated and implemented separately. The initial construction of the John U. Lloyd reach was described in a General Design Analysis (GDA) in 1976. The first renourishment of that reach of shoreline was evaluated and described in a General Design Memorandum (GDM) in 1987. The initial construction of the Hollywood/Hallandale shoreline each was evaluated in a General and Detail Design Memorandum (GDDM) in 1978. The first renourishment of that project reach is described in a 1990 addendum to the 1978 GDDM. Both reaches of the Segment III project are evaluated as one in this report. The dimensions, economics, and cost apportionment of the recommended project are compared to the 1987 John U. Lloyd GDM and the 1990 Hollywood Hallandale GDM addendum. The details of the departures from the authorized project area summarized in Table 8.

146. Project Length. The project length for the John U. Lloyd and Hollywood/Hallandale is 1.5 and 5.2 miles, respectively. These project lengths are consistent with those initially constructed along the Segment III shoreline. It is noted that since there will no design section in John U. Lloyd, advance fill will be placed along the reach of shoreline as needed. In this instance, fill will only be placed between R-86 and R-92 in John U. Lloyd. The remaining 2,000 feet of the John U. Lloyd shoreline has adequate sand in place to protect the pre-project shoreline.

147. Berm Elevation. The design berm elevations for the reevaluated Segment III project are +10.0 feet NGVD for the John U. Lloyd shoreline reach and +7.0 feet NGVD for the Hollywood/Hallandale shoreline reach. It is noted that since there will be no design section in John U. Lloyd, there is no design berm elevation requirement. The initial authorization of the Segment III shoreline included a continuous berm elevation of +10 feet NGVD. The 1978 GDDM modified the Hollywood Hallandale berm elevation to +7.0 feet NGVD to be more consistent with the back beach elevation.

148. Design Beach Section. The reevaluated extension of the mean high water shoreline for the John U. Lloyd shoreline is 0 feet and Hollywood/Hallandale shoreline is 50 feet from the Erosion

Control Line. The 1987 GDM provides for a variable shoreline extension along the John U. Lloyd shoreline each. The initially constructed John U. Lloyd design beach was estimated to be approximately 100 feet, on average. The 1990 GDM described the design berm width along the Hollywood/Hallandale shoreline to be 51 feet.

149. Volume of Nourishment. The design volume required to re-establish the design beach is 557,600 cubic yards. The total of these two volumes is 824,400 cubic yards less than the total design volume from the 1987 and 1990 GDM's. The decrease in design volume is due to the reduced design section at John U. Lloyd and fill remaining in the design section from the previous nourishments.

150. Volume of Periodic Nourishment. The amount of periodic (advanced) nourishment is approximately 10,900 cy/yr more that that called for in the 1987 GDM for John U. Lloyd and the 1990 GDM for Hollywood/Hallandale. Under the implemented plan, an estimated 140,900 cy/yr of periodic nourishment, including overfill, will be placed within the project area. The estimated periodic nourishment rate is based on the most recent beach fill performance monitoring data associated with the last renourishment of the Segment III shoreline (Appendix B).

151. Renourishment Interval. The renourishment interval was optimized to provide the lowest annual cost. The interval proposed for the renourishment project is 6 years. The 1987 GDM provided for a 5-year renourishment interval for the John U. Lloyd shoreline and the 1990 GDM provides for an 8-year renourishment interval for the Hollywood/Hallandale shoreline reach.

152. Project Costs. Annual project costs for the proposed NED project are expected to be $3,151,000. This includes the cost of fill placement, construction of structure field, hardbottom mitigation, environmental monitoring, beach tilling, geotechnical investigations, the cost of securing easements, a 15 percent contingency, and engineering, design, supervision and contract administration. Annual costs and benefits were estimated using an interest rate of 6 and1/8 percent. All costs are based on estimated 1999 price levels. The annual cost is $772,700 more than the combined annual project costs estimated in the 1987 and 1990 GDM's (Table 8).

153. Project Benefits. Project benefits have been calculated for storm damage prevention, loss of land prevention, and recreational enhancement using current policies and guidelines. The total annual benefits are $26,005,300. This is an increase of $19,688,600 over the combined benefits provided in the 1987 and 1990 GDM's (Table 6). The net annual benefits are $22,854,300 which are $18,915,900 more than the net annual combined benefits provided in the 1987 and 1990 GDM's. The benefit to cost ratio for the initial renourishment project is 8.3 to 1.0. This is about double the benefit to cost ratio reported for the 1987 and 1990 Segment III projects because of increased real estate values.

154. Federal Cost Share. The Federal cost share of eligible costs for the proposed first renourishment of the project is expected to be 56.16 percent. The proposed renourishment Federal cost share is about 1 percent less than the average Federal percentage developed in the 1987 and 1990 GDM's.

Table 8: Comparison of recommended project to 1987 and 1990 Segment III GDM's.

	Previous Construction			2000 GRR IMPLEMENTED PLAN	Departure from Previous GDM
	John U. Lloyd Reach	Hollywood/ Hallandale Reach			
	1987 GDM	1990 GDM Addendum	Total		
PROJECT LENGTH (MILES)	1.5	5.2		1.5/5.2	0
BERM ELEVATION (NGVD)	+10.0	+7.0		NA/+7.0	0
DESIGN MHW WIDTH (FT) (1),(2)	100	51		0/50	-100/-1
DESIGN VOLUME (CY)		1,382,000	1,382,000	557,600	(824,400)
ADVANCE FILL VOLUME (CY) (3)		780,000	780,000	845,100	65,100
RENOURISHMENT INTERVAL (YR)	5	8		6	
TAPER VOLUME (CY)		0	0	137,300	137,300
TOTAL FILL VOLUME	500,000	2,162,000	2,162,000	1,540,000	(622,000)
T-HEAD GROINS/JETTY SPUR	0/0	0/0		2/1	2/1
INTEREST RATE	8.875	8.875		6.625	
ANNUAL BENEFITS ($)	2,583,700	3,733,000	6,316,700	26,005,300	19,688,600
ANNUAL COST ($)	942,300	1,436,000	2,378,300	3,151,000	772,700
NET BENEFITS ($)	1,641,400	2,297,000	3,938,400	22,854,300	18,915,900
BENEFIT-TO-COST RATIO	2.7	2.6		8.3	
COST APPORTIONMENT					
Federal (%)	70.0	44.3		56.16	
Non-Federal (%)	30.0	55.7		43.84	
INITIAL COST ($)	6,369,000	9,914,000	16,283,000	24,431,000	8,148,000

(1) The MHW width is referenced from the ECL.
(2) (Departure from 1987 GDM)/(Departure from 1990 GDM Addendum)
(3) Reflects shore stabilizing contribution of T-head groins.

FINANCIAL ANALYSIS

155. A financial analysis is required for any plan being considered for U.S. Army Corps of Engineers implementation that involves non-Federal cost apportionment. The ultimate purpose of the financial analysis is to ensure that the non-Federal sponsor understands the financial commitment involved and has reasonable plans for meeting that commitment. The financial analysis shall include the non-Federal sponsor's statement of financial capability, the non-Federal Sponsor's financing plan, and an assessment of the sponsor's financial capability. These plans and analyses are part of the draft PCA package submitted to higher authority for review and approval once the GRR is approved. Broward County's funds will derive from General Revenue accrued from the charter government's ad valorem taxing authority. Broward County's large tax base and vibrant capital program provides a strong basis for confidence in the non-Federal sponsor's financial capability. Broward County has also entered into a cost sharing agreement with the State of Florida to finance this project.

ENVIRONMENTAL CONSIDERATIONS

156. Major environmental considerations taken into account during the formulation of the selected plan were sea turtles, nearshore and offshore hardbottom communities and preservation of significant historical cultural resources. Cost estimates for dredging were based upon construction of the project outside of the turtle nesting season. Buffer areas around suspected cultural resources (located in and adjacent to the primary borrow areas) were established to reduce the possibility of damaging such sites. A mitigation plan for unavoidable hardbottom community impacts has been developed. All available and practicable means and measures have been incorporated into the plan formulation process to ensure that the selected plan is environmentally sound. The mitigation plan will be initiated in May 2003.

FLOOD PLAIN DEVELOPMENT

157. The authorized project is in the base flood plain (100-year flood), and has been evaluated in accordance with Executive Order 11988. Relocation of the project outside the flood plain would not be responsive to the problems and needs of the study area and was not considered further. A non-flood plain alternative for the potential development with the project would be to restrict all future development to those areas outside the flood plain or elevated above the flood plain. Potential flood plain development as a result of project implementation would be minimal. The continued project nourishment would have minimum impact on the natural and beneficial values of the flood plain. In the without project flood plain (that area immediately adjacent to the project), there will be minimal loss of natural resources due to potential development. Implementation of any nonstructural plans that would minimize potential damage to or within the flood plain beyond those laws and regulations already adopted by local and State interests are not viable solutions under the planning constraints of this study.

FLOOD PLAIN MANAGEMENT AND FLOOD INSURANCE PROGRAMS COMPLIANCE

158. Section 402 of the Water Resources Development Act of 1986 (PL 99-662), as amended, states "Before construction of any project for local flood protection or any project for hurricane or storm-damage reduction, the non-Federal interests shall agree to participate in and comply with applicable Federal flood plain management and flood insurance programs. Broward County is enrolled in and is in compliance with the National Flood Insurance Program and participates in the Community Rating System.

USE OF OUTER CONTINENTAL SHELF LANDS

159. The Outer Continental Shelf Lands Act (OCSLA) enacted August 7, 1953**,** as amended grants the Secretary of the Interior authority to grant to qualified persons offering the highest competitive bid leases of any mineral other than oil, gas, and sulfur in any area of the Outer Continental Shelf. The OCSLA was amended by Section 1 of Public Law 103-426, October 31, 1994. The Secretary of the Interior may negotiate the use of Outer Continental Shelf sand, gravel and shall resources for use in a program of, or project for, shore protection, beach restoration or coastal wetlands restoration undertaken by a Federal, State or local government agency; or for a project that is funded in whole or in part by or authorized by the Federal Government. Section 1 (a)(2)(B) of the 1994 amendment prohibits the assessment of any fees against an agency of the Federal government, directly or indirectly.

160. Any Federal agency which proposes to make use of sand, gravel and shell resources subject to the OCSLA shall enter into a Memorandum of Agreement with the Secretary of the Interior. The Secretary of the Interior is also required to notify the Committee on Merchant Marine and Fisheries and the Committee on Natural Resources of the House of Representatives, and the Committee on Energy and Natural Resources of the Senate on any proposed project for the use of those resources prior to the use of those resources. The primary borrow areas are located within three miles of the Atlantic Ocean shoreline and are not regulated under the authority of the OCSLA.

COASTAL BARRIER RESOURCES ACT

161. The proposed Broward County Shore Protection Project does not include any recommendations which would result in any new Federal expenditures or financial assistance prohibited by the Coastal Barrier Resources Act (Public Law 97-348); nor were funds obligated in past years for this project for purposes prohibited by this Act.

COASTAL ZONE MANAGEMENT ACT

162. The Coastal Zone Management (CZM) Act of 1972, as amended (PL 92-583) requires all Federal activities inside or outside a state's coastal zone to be consistent with the state's coastal zone management plan if the activities affect natural resources, land uses, or water uses within the coastal zone. By issuance of State Water Quality Certifications on completed shore

protection projects, the State has determined that the authorized projects for which initial construction has been completed were consistent with the State CZM Act. The State will review future project work to determine if it is consistent with the State's coastal zone management plan prior to any future project construction or future nourishment of previously constructed project features.

EXECUTIVE ORDER (EO) 12898, ENVIRONMENTAL JUSTICE

163. Pursuant to EO 12898, the National Environmental Protection Act, the Clean Water Act and USACE Regulations (33 CFR 230.11 and ER 11 05-2100), a Notice of Availability will be issued for the draft Environmental Impact Statement, and General Reevaluation Report for Broward County, Florida, Shore Protection Project. Full opportunity was provided for individuals to comment/participate in review process relative to environmental justice. Section 2.2 of the EO has been followed in that the proposed project does not have the effect of excluding or discriminating against persons because of their race, color, or national origin. Compliance with Section 4-4 of the EO is met by the proposed project since subsistence fishing and/or hunting is not undertaken in the project area. Public participation and access of information have been maintained throughout the study process and will continue through the life of the project as directed by Section 5-5 of the EO. This report and the proposed project are in full compliance with EO 12898.

PUBLIC ACCESSIBILITY

164. In determination of the Federal interest in cost apportionment, Federal participation is limited to the areas where adequate public parking and access are provided. Federal participation is limited to those shoreline reaches within 1/4 mile from an access point, a reasonable walking distance for a beach visitor. For shoreline reaches farther than 1/4 mile from public parking and/or beach access point, Federal participation will not be provided, unless, public accessibility is improved prior to project construction.

PROJECT OPERATION AND MAINTENANCE

165. The non-Federal project sponsor will develop and will implement an operation and maintenance plan (OMRR&R) for these projects. The plan will be approved by the Corps of Engineers.

RECOMMENDATIONS

166. It is recommended that the authorized project for Broward County, Florida be modified and Federal construction funding provided to the local sponsor in accordance with the recommended plan described in Paragraphs 119, 120 and 121, and subject to local interests complying with the items of local cooperation, as stated in Paragraph 29 with such modifications as in the discretion of the Chief of Engineers may be advisable.

DISCLAIMER

167. The recommendations contained herein reflect the information available at this time and current Department of Army policies governing formulation of individual projects. They do not necessarily reflect program and budgeting priorities inherent in the formulation of a national Civil Works construction program nor the perspective of higher review levels within the Executive Branch. Consequently, the recommendations may be modified before they are transmitted to higher authority as proposals for project modification and/or funding.

_____

James G. May
Colonel, U.S. Army
District Engineer

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